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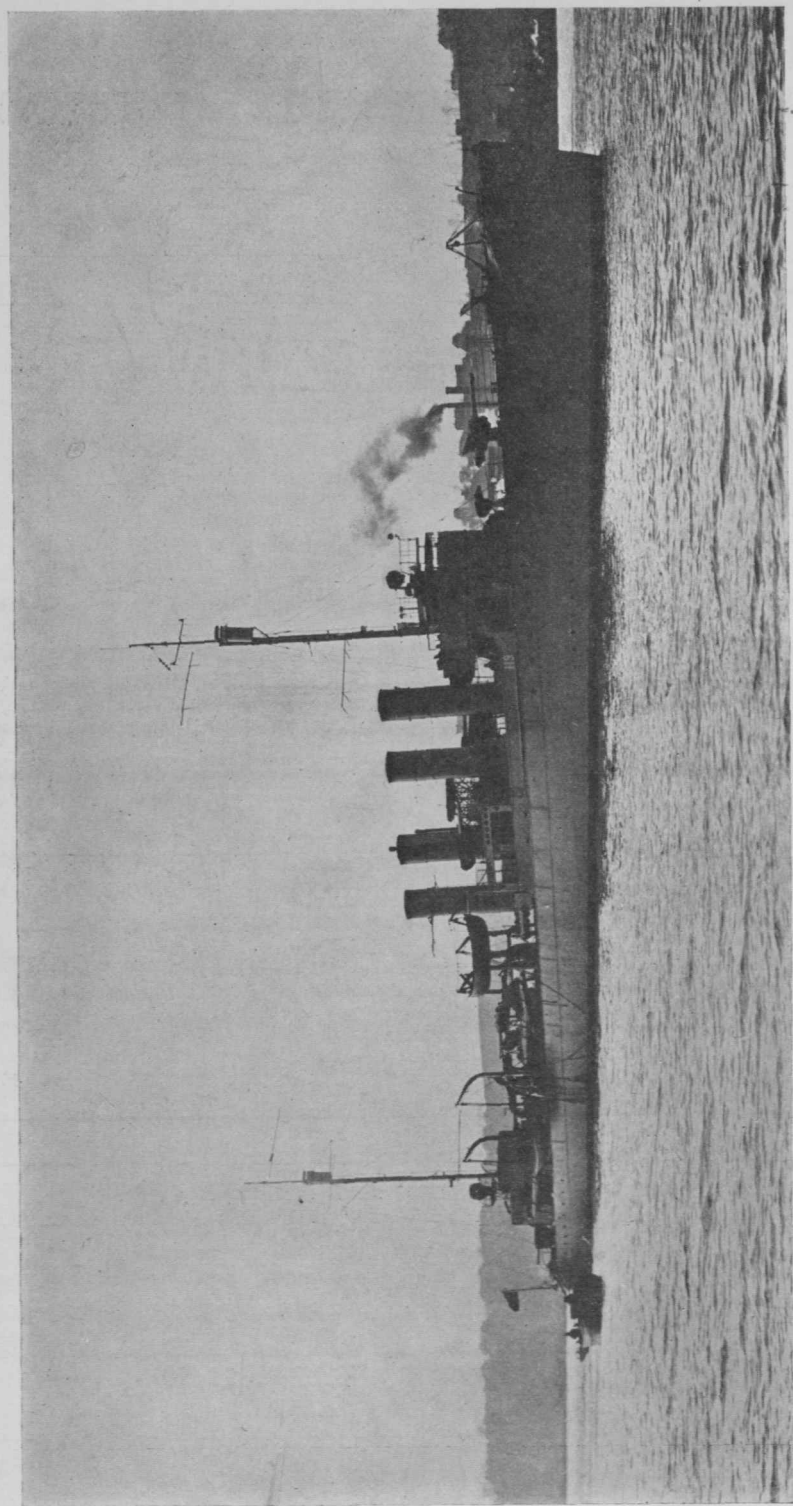
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U. S. DESTROYER LAMBERTON

Displacement: 1,213 tons. Length: 310 feet. Beam: 30¾ feet. Mean draft: 9½ feet. Speed: 35 knots. Armament: 4 4-inch, 1 3-inch AA guns; 12 21-inch torpedo tubes.

THE COAST ARTILLERY JOURNAL

Volume 70

May, 1929

Number 5

The Role of the 37-mm. Full Automatic Antiaircraft Gun

By MAJOR J. C. HAW, C. A. C.

Third Prize, Annual Essay Contest

FOR several years the Ordnance Department and the Colt Patent Firearms Company have been engaged in the development of a mobile 37-mm. full automatic antiaircraft gun and carriage. This development has now progressed to the point where success seems practically assured. However, it is believed that certain important phases of design have been neglected because of a general failure to visualize the tactical rôle which the 37-mm. should fill. That such a condition should exist is only natural, because up to date the gun has been purely an experimental proposition.

The purpose of this paper is to investigate the characteristics and possibilities of the 37-mm. gun and the different ways in which it might be employed, and to deduce from this investigation the trend which further development should take and the principles which should govern the organization and the tactical employment of troops equipped with this weapon. The necessity for such a study is evident when one considers the time, effort, and money which might be lost by an erroneous decision at this stage of progress.

The writer had the privilege of observing the 37-mm. gun throughout the 1928 Aberdeen tests, so he possesses a certain amount of first-hand information concerning it; but as for accurate statistics, the experimental nature of the project has prevented the publication of anything very definite. However, it is felt that by a careful consideration of the few figures which have been published it will be possible to arrive at approximations sufficiently accurate for our purpose.

The gun is described as follows in par. 11a, TR 435-30:

The 37-mm. antiaircraft gun.—This gun has a maximum vertical range of 5000 yards. It fires a shell provided with a fuze sufficiently sensitive to produce detonation on contact with the airplane fabric. A hit on any part of an airplane may disable it or cause material damage. The fuze is provided with a fixed time element which detonates the shell in the air, thus making the weapon safe for use over friendly territory. The normal rate of fire is 80 rounds per minute.

It is at present mounted on a trailer carriage which is towed by an automobile truck. It can be placed in position or returned to march order very

EDITOR'S NOTE.—The views expressed are those of the author. The JOURNAL would like to have a further discussion of the proper rôle of this important weapon.

quickly, compared with the mobile 3-inch MI. It is equipped for fire by Case III, using a data computer. The ammunition employed in target practice is provided with tracers.

Since the capabilities, and consequently the tactical employment, of anti-aircraft weapons depend largely upon the range which they are capable of achieving, let us compare the ranges of the 37-mm. with those of the 3-inch and the caliber 0.50 machine gun. It is quite possible that the maximum effective ranges deduced in the following discussion are slightly greater than the two automatic weapons can achieve; on the other hand, fire-control apparatus for these guns is being improved so rapidly that our figures may eventually prove to have been too conservative. In any event, it is felt that these figures are near enough to the truth to serve as the basis for our conclusions.

In par. 8e of TR 435-30, as amended by changes 1, it is stated that the mobile 3-inch gun MI is effective to an altitude of 5600 yards at a horizontal distance of 5400 yards. The maximum vertical range of the gun, however, is given as about 8200 yards. Since the effect at the point of burst depends upon the explosive power of the bursting charge and not upon the remaining velocity, it is obvious that the term "effective range" as used in TR 435-30 is based upon accuracy of fire, and the phrase should be so understood in this article.






When it comes to the caliber 0.50 machine gun, TR 435-30 offers no such definite statement of effective range. The maximum vertical range is stated as 4700 yards and the maximum horizontal range as 6650 yards; the tracers are said to be effective to 2000 or 2300 yards (Par. 11b, TR 435-30). Considering these figures, the results of past firings, and the steady improvement in sights and data computers, it seems reasonable to assume that the caliber 0.50 machine gun will eventually be capable of delivering effective fire to an altitude of 2000 yards at a horizontal distance of 2000 yards; perhaps it can do so now.

As for the 37-mm. gun itself, the only definite range given is the maximum vertical range of 5000 yards. Since this weapon is distinctly a cannon and fires an explosive projectile, it may be assumed that the rule given in par. 9, TR 435-30, is applicable. This rule reads as follows: "For the purpose of arranging the gun defense, the fire is considered to be effective at altitudes up to about two-thirds of the maximum vertical range of the fuze and within a distance from the gun of about two-thirds of the maximum horizontal range of the fuze." Applying this rule, we arrive at 3333 yards—call it 3000 yards—as the maximum effective vertical range. There are no data available for the determination of the maximum distance at which the gun is effective to this altitude, but it is reasonable to set this limit at 3000 yards.

No doubt the critical reader has noticed that with an advantage of but 300 yards in maximum vertical range, the 37-mm. has been credited with 1000 yards greater effective range than that of the machine gun. It is felt that this is justified in view of the much greater weight of projectile and the superior muzzle velocity of the 37-mm., which together should insure a much higher degree of accuracy than can ever be expected from the caliber 0.50.

So much for maximum ranges; let us consider minimum ranges for a moment. The caliber 0.50 machine gun can be pointed so easily that it is capable of picking up a plane in two or three seconds and firing upon it until the plane is right on top of the battery, so to speak. The 37-mm. cannot be aimed so quickly, but once it has picked up an approaching target it can follow that target right on in. The 3-inch gun cannot be used advantageously against targets flying lower than 500 yards altitude. (Par. 9, TR 435-30.)

Key to zones

-  3" gun not effective; cal. 0.50 and 37 mm. are effective.
-  Cal. 0.50, 37 mm., and 3" all effective.
-  37 mm. and 3" effective; cal. 0.50 not effective.
-  3" effective; cal. 0.50 and 37 mm. not effective.
-  37 mm. effective; 3" and cal. 0.50 not effective.

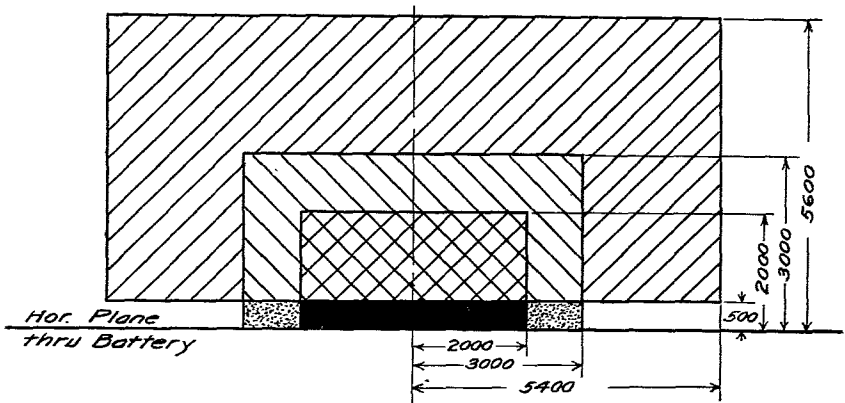


FIG. 1. ZONES OF EFFECTIVE FIRE. A PROJECTION ON THE VERTICAL PLANE

In Figures 1 and 2 all of these limiting ranges are represented graphically. Though not shown in these figures, there is of course a "dead space" immediately above each gun, since they will never be fired at 90 degrees elevation; however, for the purposes of this discussion these dead spaces may be ignored.

These diagrams show that the only zone covered by the 37-mm. alone, and not covered by either of the other weapons, is the zone below 500 yards altitude that lies in the ring between 2000 and 3000 yards distant from the battery.

The diagrams, however, do not convey an adequate conception of the difference between the horizontal area covered by the 37-mm. and that covered by the caliber 0.50, and still less do they show the truly tremendous difference between the volumes of space covered by the two weapons. According to our

assumed ranges, the caliber 0.50 should cover effectively a horizontal area of 12,566,400 square yards and a volume of space of 25,132,800 cubic yards; while the 37-mm. should cover 28,274,400 square yards and 84,823,200 cubic yards. (For the sake of simplicity, no deductions for dead spaces were made in these computations.) The 37-mm. should thus cover more than twice the horizontal area covered by the caliber 0.50 and nearly three and a half times the cubic volume covered by the latter.

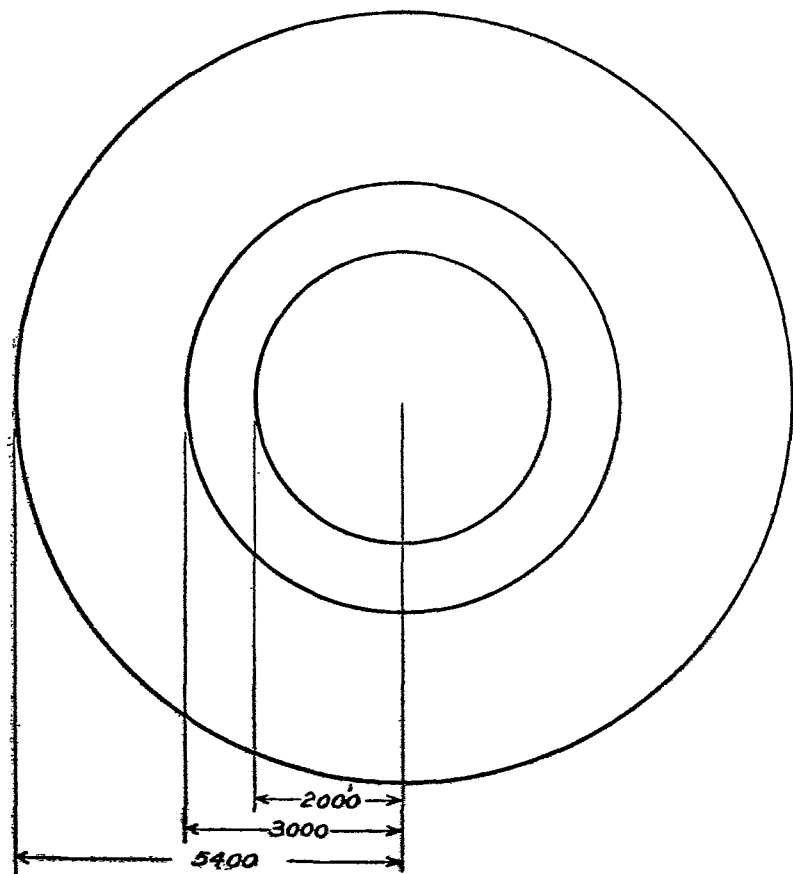


FIG. 2. ZONES OF EFFECTIVE FIRE. —A PROJECTION ON THE HORIZONTAL PLANE

There are certain other characteristics besides range which should be mentioned in discussing these various weapons. The rate of fire of the 37-mm. gun is about five times that of the 3-inch, but only about one-fifth that of the caliber 0.50. With the present mount, the 37-mm. has to move off the road to go into the firing position, while the machine gun will be mounted so as to be capable of firing from the road. Being much lighter than the 3-inch, the 37-mm. can cross weak bridges and go across country with almost the same facility as the machine-gun truck and can travel almost as fast on the road.

Its explosive projectile is the greatest asset of the 37-mm. gun. Aircraft may sometimes be riddled by machine-gun fire and still function perfectly, but one hit of a 37-mm. shell should usually disable a plane.

Having arrived at an approximate figure for the limiting effective range of the 37-mm., it is essential that we consider what targets will be found within this limit for the gun to fire upon. Pursuit formations may be dismissed without further consideration, since antiaircraft artillery is not expected to accomplish much against this type of aircraft. Day bombardment ships will rarely fly as low as 9000 feet if they have the slightest suspicion that there is antiaircraft artillery in the neighborhood; night bombardment planes may occasionally fly this low, but not often. Thus the only types of aircraft that will normally be found within range of the 37-mm. will be attack and observation ships. Let us see what the gun can accomplish against these types.

Since 9000 feet constitutes the maximum effective range of the 37-mm., the utmost that that gun could possibly accomplish against observation aviation would be the absolute denial of altitudes below 9000 feet to this type of planes. To what extent would this hinder aerial reconnaissance?

In the rear areas, the observer is looking for large establishments, troop movements in force, and other elements and activities of the same general nature; practically all of these can usually be spotted from an altitude greater than 9000 feet. Hence the 37-mm. would not accomplish very much even if it should force enemy ships to that altitude in rear areas.

In the combat area, however, observers are trying to locate front line units, artillery positions, local reserves, and similar small and inconspicuous elements; so that in this area the 37-mm. would really accomplish something of value if it should succeed in forcing observation ships to fly higher than 9000 feet. Even here, however, the gun would be merely supplementing the work of the 3-inch.

Attack aviation remains to be considered. One of the major principles of attack operations—perhaps the major principle—is that of surprise. The tactics of this branch of the Air Corps are to secure surprise by flying very low indeed—"just above the tree-tops," as Air Corps officers usually express it. Obviously, then, antiaircraft artillery units will generally have practically no warning of the approach of attack ships until they suddenly appear at very short range and low altitude. Under these circumstances, the angular travel of the target is so great that only a very flexible aiming system will permit the gun to be laid in time to open fire before the target is gone. Unfortunately, the present 37-mm. aiming apparatus is not designed to meet this condition; so that the gun as mounted now would rarely ever accomplish anything against attack aviation.

This is especially regrettable in view of the fact that the small size and high rate of fire of the gun itself render it capable of very effective fire upon surprise targets, if it could only be aimed quickly enough. Although the entire system of fire control is but illy adapted to the task of picking up a close-in target in

two or three seconds, the chief delay would be caused by the difficulties entailed in getting the two observers at the data computer to locate the plane in the fields of view of their telescopes with sufficient rapidity. Since the same delay would occur if each gun were supplied with telescopic sights, the proper way to solve the problem would be to equip each gun with open sights. If practicable, too, the elevating and traversing mechanisms should be so designed that when surprise targets appear the regular mechanism may be thrown out of gear in an instant and the piece manipulated freely by a single gun-pointer. Tracer ammunition would be essential to this system, of course; the gun-pointer would use the open sight and then adjust his fire from observation of the tracers, the use of the data computer being omitted.*

These features should, of course, be merely supplementary to the regular Case III system of fire control, since the latter is by far the more efficient against all targets except those which appear suddenly at very short range.

In line with this phase of the discussion is the proposition of firing from the road when attack planes swoop down upon a column. As previously stated, the present type of trailer carriage must be moved off the road in order to emplace the piece for firing; since the time required to take up the firing position is a matter of minutes, the target would be gone long before firing could be started.

The caliber 0.50 machine guns, however, are to be mounted in such a way that they can be fired at any instant, on the road or anywhere else. Every effort should be made to accomplish the same thing with the 37-mm. No doubt there are many difficulties to be overcome, but the advantages are so tremendous that the effort is obviously worth while. Of course, this kind of mount would be useless unless the design provided also the features necessary for the prompt delivery of tracer fire on surprise targets. A modified form of trailer carriage may be the solution, since a self-propelled truck mount would be heavy and would make the gun conspicuous when located in forward areas.

We have now reached the point where we can consider the tactical possibilities of the 37-mm. It has been brought out that as at present mounted, the gun is practically restricted to the rôle of combatting observation aviation in the forward areas, and that even in this rôle it is merely a supplement to the 3-inch gun. If this be true, as we believe it is, it must be confessed that there appears to be no real place for the 37-mm. in the tactical scheme, and that its introduction would entail additional expense, difficulties of ammunition supply, and many other undesirable complications without an adequate return. It would seem, therefore, that nothing is to be gained by further development along the present lines.

On the other hand, if the 37-mm. could be so mounted as to be capable of delivering tracer fire upon surprise targets, the situation would be entirely different. In that event we would have a weapon which could do practically everything that the caliber 0.50 machine gun can do now, with a thousand yards

* During the World War the German Army had a small automatic cannon whose projectiles combined a tracer element with an explosive charge and percussion fuze.

covered effectively by various numbers of units, and compare these with each other and with similar figures for the caliber 0.50 machine gun. We have already noted these figures for single weapons; obviously, a firing unit of several weapons located immediately adjacent to each other can cover no greater area and volume, although they can cover that area and volume several times as effectively. The table which follows (Table I) presents the comparative data. For the sake of simplicity, no deductions were made for dead spaces immediately above the firing positions.

TABLE I

| <i>Weapon</i> | <i>Number of firing units</i> | <i>Area covered (square yards)</i> | <i>Volume covered (cubic yards)</i> |
|---------------|-------------------------------|------------------------------------|-------------------------------------|
| ONE BATTALION | | | |
| 37-mm. | 4 | 113,097,600 | 339,292,800,000 |
| Cal. 0.50 | 12 | 150,796,800 | 301,593,600,000 |
| Difference | | -37,699,200 | +37,699,200,000 |
| ONE BATTALION | | | |
| 37-mm. | 8 | 226,195,200 | 678,585,600,000 |
| Cal. 0.50 | 12 | 150,796,800 | 301,593,600,000 |
| Difference | | +75,398,400 | +376,992,000,000 |

We shall have occasion to refer to Table I later.

In this connection, there is another aspect of the situation which is not illustrated by a simple comparison of areas and volumes. Protection against low-flying attack planes is best achieved by placing the automatic antiaircraft weapons close to the objective to be protected. When there are a great number of scattered elements to be covered, therefore, it is advantageous to have a large number of firing units at our disposal.

As a final step in the consideration of the organization problem, we will stake out a concrete tactical situation on the map and solve it in various ways. Figures 3, 4, and 5 show an invading Corps, acting alone, occupying a defensive position on the north shore of Long Island; it is a typical American Army Corps of three divisions and Corps troops. The dispositions of the Corps, except for antiaircraft units, are identical in the three figures. All units of the Corps are present except the Air Corps and the motor elements of the Corps train; these are both located on the north shore several miles to the east of the east edge of the map, and both are covered by attached antiaircraft artillery units, leaving the Corps antiaircraft artillery regiment free to cover the remaining elements of the Corps. The Corps is supplied by motor elements of the Corps train, which deliver to the refilling points for divisions and for Corps troops. For the sake of simplicity, command posts and 3-inch antiaircraft batteries have been omitted. The circles represent arcs of effective fire of caliber 0.50 or 37-mm. firing units, with radii of 2000 yards for the former and 3000 yards for the latter.

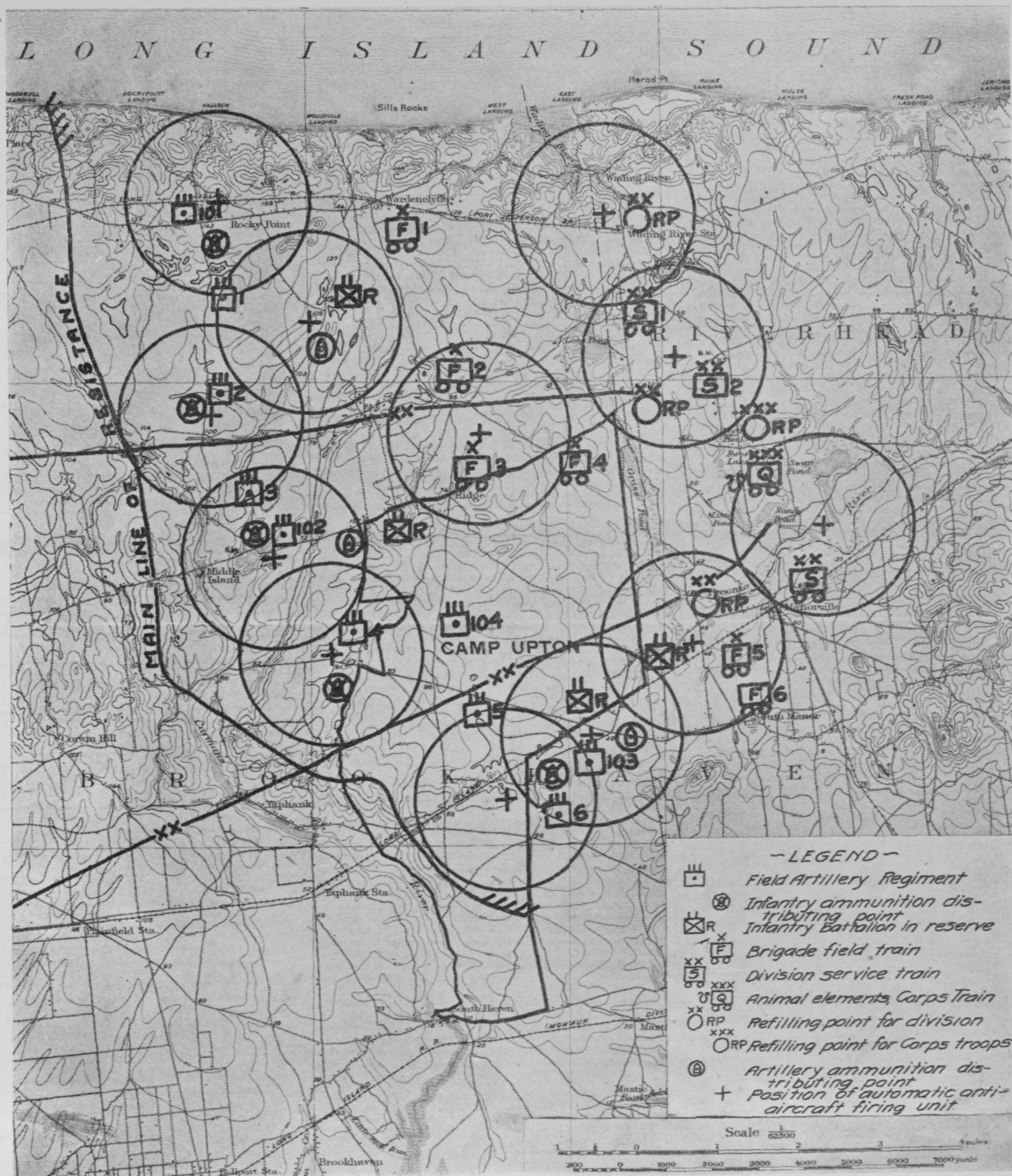


FIG. 3. BATTALION OF 12 MACHINE-GUN PLATOONS

The map shows a coastal area with various military units and installations. Key locations include Rocky Point, Camp Upton, and various islands. Military units are indicated by symbols and codes such as 'XX', 'F', 'S', 'R', 'G', 'H', 'I', 'J', 'K', 'L', 'M', 'N', 'O', 'P', 'Q', 'R', 'S', 'T', 'U', 'V', 'W', 'X', 'Y', 'Z'. A large circle labeled 'MAIN LINE OF RESISTANCE' is drawn across the map, and another circle labeled 'CAMP UPTON' is also present. The map is oriented with North at the top.

MORICHES BAY

The map is a topographic representation of a river valley. The river, labeled 'RIVER HEAD', flows from the upper right towards the lower left. Key locations marked include Rocky Point, Middle Island, Camp Upton, and various landing areas (e.g., Rocky Point Landing, Middle Island Landing). Military symbols are distributed across the map: squares with 'F' (Fort), squares with 'R' (Radio), squares with 'S' (Signal), and squares with 'A' (Artillery). Handwritten annotations include 'DISTANCE' along the river, 'MAIN LINE OF RESISTANCE' across the middle, and 'RIVER HEAD' near the top right. The map also shows contour lines, roads, and other geographical features.

The particular situation depicted, showing an independent Corps in a defensive position with three divisions in line, was chosen because it involves the maximum dispersion that will ordinarily occur and so places the most difficult task upon the antiaircraft artillery which that arm is likely to encounter. The main line of resistance is thirteen miles long and the rear elements shown are about seven miles in rear of it. In each solution, the writer tried to follow the precepts of TR 435-30, especially with regard to the dictum that on the defensive the machine guns (or 37-mm.) should be further advanced than in the attack (par. 57, TR 435-30). Especial attention was given to the left (south) flank, as the situation indicates that the enemy will probably attempt an envelopment of this flank.

Figure 3 shows a normal battalion of caliber 0.50 machine guns disposed to protect the Corps. Compare this figure with Figures 4 and 5.

Figure 4 illustrates possible dispositions of a battalion composed of four firing units of 37-mm. guns. An inspection of this figure, and a consideration of Table I and the discussion which follows Table I, indicate that such a battalion is incapable of covering a Corps properly when the Corps is well spread out in a defensive position.

A three-battery battalion of six firing units is a possibility, but would be a little awkward under existing Tables of Organization. The four-battery battalion is eminently suitable for the Corps of three divisions and Corps troops, since one battery may care for each division while the fourth is devoted to the protection of the Corps troops and trains.

In Figure 5 we have the possible dispositions of a battalion composed of eight firing units of 37-mm. guns. Although two or three elements are uncovered, it is obvious that a plane approaching from any direction except the north must pass over at least one firing unit *en route* to these unprotected elements. A consideration of this illustration, together with Table I and subsequent discussion, leads to the belief that eight 37-mm. firing units could cover a Corps a great deal more effectively than could the twelve firing units of a machine-gun battalion. Such a 37-mm. battalion should be organized into four batteries of two firing units (platoons) per battery. So much for organization.

As yet, nothing has been said as to danger for our own ground troops from 37-mm. fire. This danger will be largely obviated by the safety time element of the fuze, already mentioned in the description of the gun quoted from TR 435-30. As for shells which happen to strike the ground before this device has time to function, it is probable that the 37-mm. is no more dangerous to ground troops than is the caliber 0.50 machine gun, which puts five bullets into the air for every shell fired by the 37-mm.

In closing, the conclusions reached in this discussion may be summarized as follows:

While the 37-mm. full automatic antiaircraft gun is a weapon of great promise, the limitations imposed by the present design of mount and fire-control apparatus reduce its sphere of usefulness to such an extent that further development along the same line would appear to be unprofitable.

On the other hand, there is good reason to suppose that the gun mount and fire-control apparatus can be so designed as to make the 37-mm. capable of meeting surprise targets by tracer fire, while retaining the present advantageous features; and it is quite possible that these improvements could be augmented by arrangements which would permit the gun to be fired from the road with a delay of only a few seconds. In any event, the future development of the weapon should be directed along these lines.

If these things can be accomplished, statistics should be gathered (by extensive firings if necessary) to show the true relative efficiency of the caliber 0.50 machine gun and the 37-mm. gun in terms of planes disabled per unit of time; and if the efficiency of the latter equals or surpasses that of the machine gun, it should supplant that weapon as the principal light armament of the antiaircraft artillery regiments.

In this event, battalions of 37-mm. guns should be organized into four batteries of two platoons per battery, each platoon to be equipped with a data computer and the minimum number of guns necessary to constitute an efficient firing unit.

The tactical employment of such organizations should be governed by the general principles now recognized in the tactical employment of organizations armed with the caliber 0.50 machine gun.

I believe that the finest thing about these summer camps is their spirit of American democracy. . . . Here are camps which offer the same opportunity to all young men, whether their parents are wealthy or not. All of these young men have the same course, all wear the uniform and each one has the full opportunity to gain the benefits. . . . The young men are not only of all social classes, they are also of all creeds.—Secretary of War John W. Weeks.

Caretaking

By CAPTAIN ROBERT N. MACKIN, JR., 14th Coast Artillery

A very large percentage of the Coast Artillery armament in the United States is in the hands of caretakers, either under local Ordnance Officers or small caretaking detachments.

An officer newly assigned to this work, whether coming from school, R. O. T. C., Organized Reserve, National Guard, foreign service, staff, or troop duty, naturally would seek a training manual or similar publication as a guide for the most efficient carrying on of the work. He will find that Section XI, T. R. 435-220, has some valuable information, principally prepared, however, for the care of armament "in service." Should the officer have recourse to the Ordnance Field Service Bulletins he will find some further information in Section III, O. F. S. B. No. 4. These latter instructions apply more particularly to the care of armament and equipment in arsenals and depots. Those paragraphs applying to materiel in the hands of the Coast Artillery are excellent and the result of long experience, but the caretaker must, to express it briefly, serve two masters. He must at the same time preserve the materiel from deterioration and also present the materiel to inspecting officers, some of whom, naturally, have had little Ordnance or Artillery experience, in an attractive condition as to *appearance*.

It is a very simple matter to take a few warm days in summer and daub an unsightly preparation of white lead over all bright and moving parts of the guns and carriages; gather all tools, slush them and pack them in their chests; pack all instruments away, etc., etc.; but, if it can be accomplished, how much better will it suit our ends to have all materiel in its proper place for service, ready for instant use, properly lubricated, and in a clean, bright, attractive condition?

With the latter happy condition as our objective let us now consider the means to accomplish that end.

GENERAL POLICY

First it is imperative that a definite policy be adopted as to the condition in which we will maintain the armament "out of service" and just how we will dispose of the various instruments, tools, and similar materiel pertaining to that armament.

For caretaking purposes all materiel at Coast Artillery posts which is serviceable and not in the hands of troops should be considered as "in commission" "out of service." No materiel should be considered "inactive." No one can be certain just when any piece of materiel in our hands may be needed for use.

All armament and the accessories thereto should be kept ready for service at all times; all equipment for the service of each battery should be kept at

that battery; there should be no inter-battery borrowing of equipment; all materiel should be maintained clean, bright, and attractive in appearance, and displayed so as to facilitate inspection. Emplacements, galleries, magazines, parades, drains, approaches, and similar physical features of batteries should be maintained in a clean and attractive condition.

METHODS OF CARETAKING

The following methods of taking care of the various types of materiel are suggested:

LUBRICANTS, CLEANING AND PRESERVING MATERIALS

Following are listed the principal lubricants and cleaning and preserving materials used in caretaking and brief descriptions of their uses:

1. *Cloth, crocus (commercial)*. This cloth is used for cleaning and polishing finished surfaces such as breechblocks and brass work. Its use on fire-control instruments is forbidden.

2. *Cloth, emery, No. 00 (commercial)*. This cloth is used for cleaning and removing rust from finished iron and steel surfaces. It is the coarsest abrasive permitted for work on breech mechanisms. Its use on soft metals such as brass, bronze, and babbit is prohibited.

3. *Cloth, emery, Nos. 0 and $\frac{1}{2}$ (commercial)*. These cloths are used in cleaning finished iron and steel surfaces where deterioration has occurred and for removing burrs and scratches.

4. *Cloth, emery, No. 1-Medium and No. 3-Coarse*. These cloths are used in removing rust, burrs, and other defects from unfinished surfaces of steel and iron.

5. *Compound, cleaning (sodium carbonate)*. This cleaning compound is used in a solution for cleaning bores and breech mechanisms of small-arms and cannon and for removing grease and dirt from materiel preparatory to painting. To prepare the solution dissolve one-half pound of cleaning compound in one gallon of boiling water.

6. *Compound, rust preventative, grade A*. This oil, formerly called heavy slushing oil, is a semi-solid preparation used in the preservation of finished surfaces of iron and steel. In cold weather it is necessary to warm the compound before application.

7. *Compound, rust preventative, grade B*. This oil, formerly called light slushing oil, is a preparation similar to grade A, but is in liquid form and not nearly so heavy.

8. *Gasoline*. Gasoline is used for cleaning purposes only.

9. *Grease, lubricating cup, No. 5*. This grease is used in the compression grease cups and gear cases of heavy seacoast and railway materiel.

10. *Lime*. Lime is used in the preparation of a solution for removing paint from materiel. The solution is prepared by dissolving one pound of lye, powdered form, in six pints of hot water and adding enough lime to give the

solution the consistency of paint. The solution should be used freshly mixed and applied with a brush or waste tied to the end of a stick. When the solution begins to dry on the surface, use a scraper to remove the old paint. Complete the cleaning by washing thoroughly with a solution of cleaning compound (sodium carbonate) and water; this neutralizes the action of the lye and the lime.

11. *Lye, concentrated.* See paragraph 10.

12. *Oil, lubricating, class A-light.* This oil is commonly called engine oil.

13. *Oil, Neat's foot.* This oil is used in the preservation of leather equipment.

14. *Sandpaper (commercial).* Sandpaper is used on the surfaces of wooden parts of materiel. It should be applied with caution.

15. *Coat A.* This is a mixture of three parts compound, rust preventative, grade B, and one part oil, lubricating, class A-light. The oils should be mixed when warm, a temperature of 70°F. being sufficient. The coat is transparent and clean looking. It adheres to metal tenaciously when properly applied. The surface to be coated should be thoroughly clean, dry, and not cold. The coat is a splendid cover for all exposed finished metal surfaces of guns, their carriages, and similar materiel.

16. *Coat B.* This is a mixture of three parts of compound, rust preventative, grade B, and one part compound, rust preventative, grade A. The coat should be mixed and applied as prescribed for Coat A, and is used on the finished surfaces of the materiel to replace Coat A, when the latter is not found sufficiently heavy.

Other materiel. In addition to the above mentioned materials there are, of course, paints, varnish, brushes, burlap, and many other articles used in caretaking, but their uses are clearly defined and well understood by the average Coast Artilleryman.

GUN CARRIAGES

Except as noted hereinafter, all bearing and other finished surfaces should be cleaned with gasoline, permitted to dry thoroughly, and covered with an application of Coat A. This application will furnish ample lubrication and preservation for those parts of the materiel between April and September. It is believed that this coat would furnish ample protection the year round on the West Coast, in the Gulf States, and on the East Coast south of the 40th parallel of latitude.

Where a heavier coat is found necessary, Coat A should be removed with waste and a good application of Coat B applied. A warm day in the fall should be selected for this work.

Those parts which function from time to time in elevating, traversing, and tripping should, of course, be recoated each time they are used. All brass and German silver scales should first be polished with metal polish and then coated with oil, lubricating, class A-light. This prevents oxidation and keeps the

parts bright and clean permanently. All brass handles and similar parts of the carriage should be kept clean and dry, but not polished.

Recoil cylinders should be cleaned at least once each year, preferably under the supervision of an Ordnance machinist. The cylinder head and piston rod should be removed, the interior of the cylinder cleaned with gasoline, and when dry, coated with compound, rust preventative, grade A. The oil level in the cylinders should always be maintained even with the filling holes. Kick-down and buffer cylinders should be kept filled with hydrolene at all times.

The oil cylinders of the 3-inch antiaircraft materiel, Models 1917 and 1918, should be drained, cleaned, and refilled annually, as prescribed in the particular gun handbooks, Ordnance pamphlets 1808 and 2018, except that gasoline should be used for flushing instead of coal oil, as prescribed.

The replenishers of the 155-mm. G. P. F. materiel should be exercised once each four months by draining and refilling. Caretakers should not disassemble the 155-mm. recoil and recuperator mechanisms. Such work is a function of the Ordnance Department.

All traversing rollers and paths should be cleaned and coated with compound, rust preventative, grade A, once every six months if practicable, and certainly once each year.

All compression grease cups on guns and carriages should be filled with grease, lubricating cup, No. 5, and the caps screwed down whenever necessary, so as to maintain the pressure of the spring upon the grease. The normal position of the spring rod is about $\frac{1}{4}$ -inch above the top of the cap. The grease cups on heavy-duty open bearings, such as the trunnions of major-caliber guns, should be filled with graphite grease.

Oil holes should be kept free from dirt, a heavy wire being found valuable in this work. A generous supply of oil should be inserted before each inspection.

In applying lubricants, all moving components will be maneuvered to insure that the lubricants reach all bearing surfaces.

Care should be taken that magnetoes, switches, insulated covering of wires, commutators, and other electrical apparatus are kept free from all oil and grease.

Carriages should be traversed between limits in the presence of the inspecting officer at each inspection and brought to a rest at an azimuth different from that at which traversing was commenced.

Elevating mechanisms should be operated between stops at each inspection.

Disappearing carriages should be tripped at the last inspection of each month during the year.

Barbette carriages should be brought to full recoil at least once each year, the exposed parts examined and cared for, and the carriages released.

All motors installed on gun carriages should be operated at each inspection by a commissioned officer.

All gun carriages should normally remain with their guns at an elevation of 5 degrees plus: barbette carriages in the "in battery" position; disappearing carriages in the "from battery" position.

MORTAR CARRIAGES

The instructions given in the preceeding paragraphs for the lubrication and care of gun carriages should be followed where they apply to mortar carriages. Once every two years mortars should be dismantled and the carriages cleaned, overhauled, and repainted. This work should be performed under the direction of an Ordnance machinist.

All mortars, except the Model 1918, which should be elevated about 5 degrees, should remain elevated with their axes parallel to the piston rods.

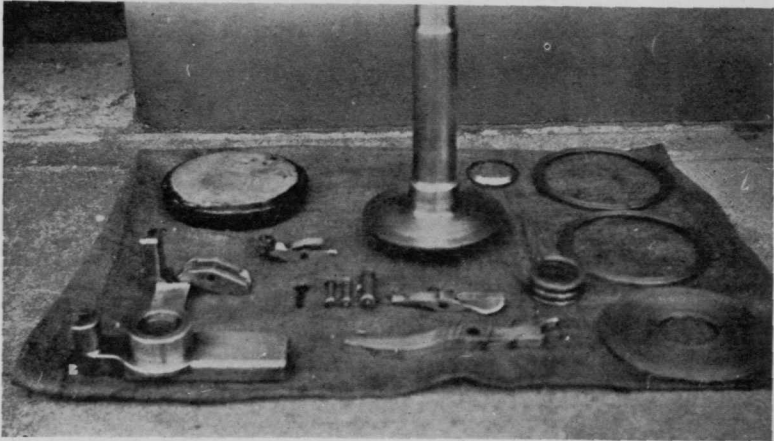


FIG. 1. SAMPLE DISPLAY OF THE DISMANTLED PARTS OF THE BREECHBLOCK

ALL CARRIAGES

The oil or grease which has overflowed from oil holes, filling holes, or grease cups should not be permitted to mar the appearance of carriages but should be removed with gasoline and clean waste.

GUNS AND MORTARS

In the spring and fall, all oil should be removed from the chambers and bores of all guns and mortars, the bores cleaned dry under considerable pressure and then thoroughly recoated with compound, rust preventative, grade A. This coat should not be applied when the bore is cold nor should the coat be very heavy. A light coat properly applied is much more efficient as a preservative than a heavy coat and presents a much finer appearance.

Caretaking detachments rarely have sufficient personnel properly to man the bore sponge on large guns or mortars. Excellent results can be obtained by the use of a pull-through, *i. e.*, a rope passed through the bore and attached at the breech-end to an improvised sponge head. Sufficient burlap is wrapped

around the head to obtain the desired pressure and the head is drawn through the bore from the muzzle. The motive power may either be a truck, tractor, capstan, or tackle. In this way three men can thoroughly clean and oil the bores of the largest guns.

All breechblocks, except those on antiaircraft guns and 3-inch seacoast guns, should be dismantled, and in each case the mushroom head, split rings, filling-in disc, and spindle nut should be oiled with Coat A and neatly laid out on a clean rectangular piece of folded burlap in front of the gun tool-board, with no parts touching.

Particular care must be paid to the vent, which should be thoroughly cleaned and coated with oil, lubricating, class A-light. Officers should examine the vent at each inspection by tilting the spindle so as to permit the light to penetrate the vent. The vent is an extremely important part of cannon and should be so treated.

The bearing parts of the breech mechanism are lubricated with oil, lubricating, class A-light. A mixture of No. 5 cup grease and flake graphite, four-to-one, should be used on translating rollers.

The gas-check pad should be placed in its regular container, hermetically sealed, and placed in a horizontal position on the burlap. The breechblocks should be dismounted from the 3-inch seacoast and antiaircraft guns, oiled with Coat A, and the parts neatly displayed on a square piece of folded burlap in front of the gun tool-board.

All bright parts of the breech face, breechblock, and operating mechanism should be oiled with Coat A. A sufficiently large piece of waste, saturated with Coat A, should be placed as a tight plug in the spindle recess.

All breech covers should be removed from guns and mortars, except the 3-inch seacoast and antiaircraft guns, thoroughly washed and cleaned with gasoline, neatly folded, and placed in clean, dry storage in the battery tool rooms.

The safety lanyard devices on guns mounted on disappearing carriages should be exercised at each inspection by a commissioned officer.

The operating handles and translating rollers of breechblocks, after being oiled with Coat A, should be stored openly on suitable, neat holders in the battery tool rooms, except when they are actually in use.

Firing mechanisms should be oiled with Coat A and placed in the boxes provided. These boxes should be kept on a shelf in the battery tool room with the lid open so as to permit inspection at a glance. The parts of the mechanism being small, it has not been found satisfactory to display them individually.

Except in the case of 3-inch seacoast and antiaircraft guns, the breech mechanisms of all guns and mortars should be operated at each inspection by a commissioned officer.

SUBCALIBER GUNS

Each subcaliber gun for armament above 3-inch in caliber should be displayed in a battery store-room on a carrier, such as a shot truck, to permit

examination of the bore at a glance. (See Fig. 2.) The bores of these guns should be cared for in the manner prescribed for the bores of large guns and mortars.

A simple elevated rack should be constructed for the display of cal. .30 subcaliber cartridges, the bores of which should be cleaned in the manner prescribed for rifles.

All tools pertaining to subcaliber guns should remain in the chests provided for them, but chests should remain open at all times.

All bright and bearing surfaces of subcaliber guns and their accessories should be oiled with a light application of Coat A.

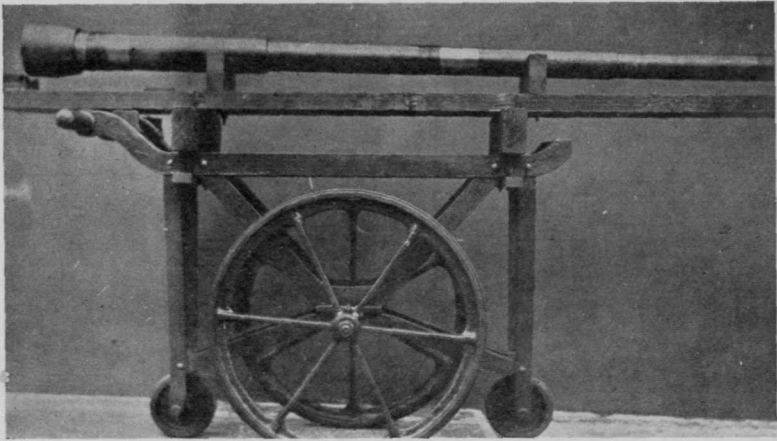


FIG. 2. ONE-POUNDER (1.457-INCH) SUBCALIBER TUBE MOUNTED ON IMPROVISED CARRIER TO FACILITATE INSPECTION

PAINTING OF GUNS, MORTARS, AND THEIR CARRIAGES

The instructions given for painting this materiel in T. R. 435-220 are excellent and need little elaboration.

Paragraph 43 (b) (8), states: "When paint becomes so thick as to scale off in places or to give an unsightly appearance . . . it should be removed for repainting." That is certainly a sensible statement. Removing the old paint from a large gun or carriage is a major operation for small detachments.

There are two purposes in painting materiel, viz., preservation and appearance. In caretaking it is believed that these two purposes are best served when the painted surface presents a clean, clear, unstained appearance and the wood or metal underneath is protected from deterioration. At some posts a good application of paint will last many years and the frequency with which materiel is to be painted is a matter of local decision.

The red paint specified for grease cups, oil plugs, name and direction plates should be red *paint* and not red lead. Vermillion contrasts splendidly with the standard olive drab paint.

Paint-spraying machines are not considered a success in painting armament. There are so many gears, bearing surfaces, operating parts, and points of

lubrication that hand work with a brush has been found to consume less time than using a spray with the resultant cleaning up of parts not desired to be painted.

COVERS FOR MATERIEL

The disposition of breech covers has already been mentioned. Regarding that practice and the disposition of breech covers for other parts of guns and carriages, the thought is advanced that possibly breech covers, piston-rod covers, and all the many, various, standard and improvised covers of canvas, wood, and tin are not a complete success in caretaking. Muzzle covers are a necessity, as there is no drain hole in the breech of a gun.

Where a cover is suspended above and not touching a lubricated surface, there is, undoubtedly, additional protection from rain and hail, but not from flying sand and snow. However, most covers, breech covers in particular, do touch some parts of the finished surfaces. The result is that the oil is rubbed off and rust ensues; then, in time, pitting. Some canvas covers also cause condensation. It is held that we are supplied excellent preservatives which, if properly applied, will protect any finished surface against the elements.

Further, covers require labor for their removal and tend to make materiel unsightly in addition to interfering with facility in inspection.

It is not recommended that all covers be dispensed with, irrespective of climatic conditions, but these ideas are submitted for consideration. They have worked very well in two defenses.

TOOLS AND TOOL ROOMS

The improvised tool-boards found almost universally in coast artillery batteries can hardly be excelled as a means of displaying, checking, and caring for the standard tools of those batteries. To be most effective, however, the spaces on the boards should be altered when permanent changes are made in the tools of the battery.

Similar boards should be made for armament added to the Coast Artillery in the last ten years and now on permanent assignment. In the absence of tool-boards, the tools can be displayed on neat squares of burlap placed on the floor adjacent to the armament in the latter's place of storage. Good results have been obtained with 155-mm. and 3-inch antiaircraft equipment by arranging the various tool chests in the form of the letter *U*, with the covers opening outward and the tools displayed on burlap in the center of the *U*.

All chests should be elevated on skids, kept open, and, whenever at all possible, empty, the contents being displayed in the same room with each individual article exposed.

Sight cases should be kept on shelves, with the covers closed but not secured.

A separate, painted rack or board should be made for the Quartermaster property in batteries, such as brooms, shovels, saws, and nail-pullers.

All finished surfaces of tools and the entire surfaces of files should be oiled with a light application of Coat A. The grips and handles (wood and steel) should be painted a convenient color. Olive drab is suggested; black is satisfactory.

The staves of rammers, bore and chamber sponges, brushes, and scrapers should be painted olive drab. Sponge heads should be kept clean and stripped of old, used burlap.

Should there be sufficient obsolete projectile or gun paint on hand, as is really the case in many forts, the normal oil-stained and often unsightly floors of tool rooms can be enormously improved by the application of a coat of such paint.

A well-kept tool room can be made a thing of beauty in the eyes of an artilleryman. In caretaking there are but few tools in constant use and there is little need for disturbing the appearance of tool rooms. Should the armament be used by other components of the army for a few weeks in the summer, it will be found that our civilian friends are delighted to find such conditions prevailing and eager to help maintain them so.

OIL ROOMS

Oil rooms should contain only cleaning and preserving materials and their receptacles. Oil cans and paint cans should be segregated on shelves and plainly labeled to denote their contents. All unsightly and useless containers should be disposed of. Caretakers should make a practice of using small, handily carried oil and paint containers when working about the armament, refilling the containers as is necessary from the original containers on shelves. Oil brushes may be kept in the small oil containers, but a small rack should be improvised to hold all paint brushes immersed in water. The lower part of a five-gallon oil can, cut about six inches from the bottom, boxed, with two uprights supporting a horizontal board containing a row of wire nails makes a good rack. The brush handles are, of course, bored at the proper place, so that the brush proper is completely immersed in water when the handle is hung upon the nail.

Burlap should be kept on a roller or reel, supported about two feet from the floor.

Only clean waste should be kept in the oil rooms. Used, serviceable waste should be kept in a container outside of the oil room, where there is no danger from possible combustion. Surplus, small, corrugated powder cans make excellent containers for waste.

Sand boxes placed under oil and paint shelves help considerably in keeping the rooms neat and clean.

No supplies should be placed on the floor. Such articles as lye, soap, scrub brushes, etc., should be neatly arranged on the shelving.

All shelves, waste containers, oil reservoirs, and racks should be painted, preferably olive drab, but the important consideration is that they be painted. Floors should be painted as outlined for tool rooms.

PLOTTING ROOMS

All smooth, finished metal surfaces of position-finding apparatus should be polished and these surfaces, with all sand-blasted surfaces of the apparatus, should be coated with a light application of oil, lubricating, class A-light.

Gun-arm center boxes should be kept open and empty, the targ, rulers, tools, and spare parts being neatly displayed on the plotting board. The canvas cover of the board should be clean (washed, if soiled), folded to a one-foot square, and placed beside the tools. When observing instruments are stored in plotting rooms they should be mounted on their tripods; the instrument cases beneath the tripods, opened.

All old data recording sheets, used plotting paper, obsolete data, and similar refuse should be cleared out under the supervision of an officer.

All apparatus should be in adjustment and oriented, with orientation data clearly displayed. The charts for range, deflection, and other boards should be of the latest approved type for the particular armament.

Worn out, unsightly rubber floor matting should be replaced.

OBSERVING STATIONS

All instruments should be kept on their proper mounts, oriented, lubricated, and covered, where standard covers are provided, for protection from dust. All instrument cases should be open and empty, except for the extra eye-pieces and spider-line cells, which should be kept in their pockets. Tools should be displayed on the tool rolls in front of their respective cases. Correct orientation data should be clearly displayed. All extraneous papers should be disposed of as mentioned for plotting rooms.

TELEPHONES

Present Signal Corps regulations require all telephone headsets, except those in reserve, to be connected and in place ready for use. In one harbor defense, however, approval was given to the practice of keeping headsets for telephones in uncovered emergency stations, gun platforms, etc., in the battery plotting rooms. It is believed this practice greatly assists in prolonging the life of this materiel.

Good caretaking cannot countenance broken mouthpieces, broken cords or wires, nor rubber ear-caps in a state of deterioration. The local Artillery Engineer will gladly place this materiel in good condition.

LEATHER EQUIPMENT

There is considerable leather in the hands of caretakers—instrument cases, carrying straps, gunners' pouches, covers, and several other articles. Very few materials deteriorate as quickly, or appear so unsightly, as moldy leather. Cleaning leather which has been saturated with mineral oils, as is often the case with gunners' pouches, presents a difficult problem. It is recommended

that such leather, and all other soiled leather, first be washed in clean, warm water, using a good, heavy lather of saddle soap applied with a clean sponge. After washing the leather, it should be rinsed well in water to remove all soap, and permitted to dry in a natural way, not by artificial heat nor the direct rays of the sun. When it is nearly dry a coating of neat's-foot oil should be applied, the oil being rubbed in thoroughly. Excess oil should be wiped off with a soft rag. It is hardly possible to restore the original light color to the leather or to remove the stains, but this treatment will stop deterioration and preserve the leather indefinitely. All leather equipment should be coated with neat's-foot oil in a similar manner.

POWDER AND PROJECTILE MAGAZINES

The instructions published in regulations for the care and storage of explosives are clear and definite. The following notes, however, may be of some assistance.

In all cases, explosive containers should be placed on skids above the floor, with skids between tiers and at least one inch of space between containers laterally. When restacking containers, neatness and uniformity should be the watchword. The part of the container bearing the description of contents should be placed in such a position that the description may be read without moving the container.

Good results have been obtained by stacking all single-section powder cans horizontally, tops toward the aisles. When stacked this way vertical supports should be placed between each tier. Powder containers should be painted black, with the description of contents stencilled in white.

Projectiles should be painted as prescribed in O. P. 2036, but should there be any delay in painting, their surfaces should be protected with a light application of Coat A.

In some magazines there is considerable precipitation of lime from ceilings. Strips of burlap or similar material suspended over powder containers and projectiles will afford good protection to the material, but the covering should not rest on the cans or projectiles, as that practice interferes with inspection and actually increases deterioration.

Dummy projectiles should not be painted but oiled with a light application of Coat A. These projectiles should not be kept on shot hoists or serving trays but neatly stacked by themselves on skids in a magazine beneath a trolley. Dunnage for the storage of ammunition is supplied by the Engineer Department upon requisition—Authority: par. 21 a 3, O. F. S. B. No. 2, Section I.

HOISTS

All hoists should be kept well painted and lubricated, the brass parts should be polished, and covered with a light application of Coat A. When electric current is available each hoist should be operated at the approach of a commissioned officer on inspection. Should current not be available the hoists should be operated by hand.

AMMUNITION TRUCKS

All ammunition trucks should be painted when the guns and carriages are painted and in a similar manner. Six-inch shot trucks should be stored inverted with the trays on skids. Trucks for larger caliber guns should be raised on skids with the wheels free from the floor. Oil holes and bearing surfaces should be cared for as prescribed for gun carriages. Buffer cylinders should be kept filled with hydrolene at all times. Except for inspection, the rooms in which shot trucks with rubber wheels are stored, should be kept as dark as possible for the preservation of the rubber. One member of the caretaking personnel at each post should be specialized in the replacement of worn-out rubber tires with rope tires.

DOORS, RAILS AND RAILINGS, TROLLEYS AND CHAIN BLOCKS

This equipment of batteries is normally kept painted by the Engineer Department but its lubrication is the responsibility of caretakers. All bright parts should be covered with an application of Coat A, particularly the chain blocks. A few drops of oil, lubricating, class A-light, should be inserted monthly in the mechanism of door locks.

BATTERY EXTERIORS

If only on the basis that first impressions are important, the approaches and exteriors of batteries should present a neat, clean, cared-for appearance. Gravel roads should be raked and, if possible, cleared of weeds and grass; there should be but two receptacles in front of the battery: a can for soiled waste and a can for rubbish. Oil-strained concrete can be cleaned with a lye solution. Grass and brush which obstruct the vision from gunpointers' platforms or B. C. stations should be removed by cutting or careful burning. Grass should not be permitted to become a fire hazard and, while it is not expected that grass-covered areas adjacent to the battery should present the appearance of a city lawn, it is often possible to secure a horse-drawn mower, or, as a last resort, careful burning can be employed.

MATERIEL UNDER COVER

Materiel stored under good cover, such as 155-mm. guns, mobile anti-aircraft guns, mobile searchlights, tractors, and motor vehicles, should present no problem to the caretaker. Once placed in the condition outlined in the fixed armament paragraphs, but little care is required to maintain it in that condition. A certain date each month should be specified on which all motors will be operated for ten minutes. Lighter, more transparent oils which enhance appearance may be used on materiel under good cover.

The practice of removing and displaying tools from tool chests should be carried out whenever at all possible in the care of this type of material. This is not practicable in the case of Artillery repair trucks and similar vehicles,

but the tools in the various drawers should be kept oiled and painted as described in the paragraph "Tools and Tool Rooms." The care of motor vehicles is fully described in the handbook for each type and need not be discussed herein.

STOREHOUSES

The principles enumerated through-out this article should be followed in the care of storehouses. All packages should be neatly stacked off the floor and clearly marked as to contents. All tools should be oiled as described herein and neatly piled. All articles pertaining to a particular armament, vehicle, department, or activity should be grouped, with shelves or receptacles plainly labeled to show their contents. Everything should be so displayed as to facilitate issue, inventory, and inspection.

The floors of oil and paint storehouses should be covered with an inch of clean, dry sand or sawdust.

EMPLACEMENT BOOKS AND PROPERTY RECORDS

All gun and emplacement books should be collected and neatly filed in the office of the local Ordnance Officer who should keep the books up to date in accordance with the instructions contained in A. R. 90-80. It has been found labor-saving and convenient to keep a tickler recording each event requiring notation and to make these entries in all books affected on the first day of each quarter.

In each B. C. station there should be a clip board holding an original memorandum receipt listing every item of stock record equipment in the battery, less the cleaning and preserving materials. This receipt should be the basis of check for special and annual inventories. A copy of the receipt is kept in the stock record office. When the battery is placed "in service," the original receipt is signed by the officer taking command and filed in the stock record office. He is furnished the duplicate copy. When the battery is turned back, the receipts change hands. Obviously, when changes are made in the equipment of a battery, the memorandum receipt must be changed accordingly, but changes should be kept to an absolute minimum. Property damaged or worn out should immediately be replaced in kind.

INSPECTIONS

Here we have the only certain insurance of good caretaking—*intelligent, frequent, and careful inspections* by the officer charged with caretaking or by his commissioned assistants. This work should not be delegated to enlisted men.

Once each year it will be necessary to make up a schedule in each defense, showing definite periods when the important operations in the work specifically called for by regulations, will be carried out. For example:

Fourth week in April—Change to Coat A.

First week in May—Clean recoil cylinders.

Second week in May and October—Clean traversing rollers and paths.

Third week in May—Exercise all barbette carriages.

Third week in March, June, September, and December—Exercise 155-mm. replenishers.

Fourth week in May and October—Clean bores.

Month of June—Overhaul mortars.

Fourth week in September—Change to Coat B.

The schedule should be as brief as possible and made after consideration of the climate in each defense. One copy of the schedule is sent to each fort caretaker only. Private John Caretaker, of Battery X, should receive no written communications. The writer has no faith whatever in the issuing to enlisted caretakers of voluminous work sheets.

There is only one sure way for the responsible officer to determine whether the materiel is properly cared for and that is by personal inspection. If physically possible, each battery under caretaking should be inspected at least once each week, every week in the year. Fridays are good days for inspections. Haphazard inspections disgust the men and do harm. The inspections should be regular and well-planned. For example: While all activities should be visited at each inspection, during the first week's inspection of each month a thorough inspection should be made of the armament proper; the second week, magazines and store-rooms; the third week, B. C. stations, plotting rooms, and observing stations; the fourth week, power plants and storehouses. Each inspector should equip himself with a reminder list for each of these groups, each list naming briefly each part of the materiel or property in the group which should be examined in a thorough inspection. Obviously, these various lists cannot be included in this article nor need they be. Any interested Coast Artillery officer can make up complete lists with a little study of the materiel. The lists should be typewritten on paper, and the paper pasted on good, stiff cardboard of a size to fit the upper pockets of the uniform blouse. Only those lists need be carried which pertain to the group under thorough inspection.

This type of inspecting is hard, grinding work but it certainly has its rewards. Commanding officers can often help tremendously by being favorably inclined toward granting requests from the caretaking officer for commissioned assistants.

Regularity is a virtue in caretaking.

Inspectors should make pencilled notes of defects found and indicate the defects to the caretakers. On the next inspection, the notes should be referred to in order to ascertain whether the defects have been remedied.

GENERAL

None of the ideas presented herein are untried theory, but have been and are being carried out in practice and are giving good results.

Once a battery has been placed in the condition outlined herein, it is a very simple matter to keep it in that condition; in fact, one good soldier working

thirty-six hours per week can properly care for two major-caliber batteries after a working detail has placed them in condition.

Caretakers take great pride in a good-looking battery and a spirit of good-natured rivalry should be encouraged. A word of commendation from senior officers works wonders. If a battery is skipped during the inspection of a visiting ranking officer, the officer in charge of caretaking should immediately secure the highest ranking resident officer in sight and have him complete the inspection with full formality. Without nursing the men, officers should work toward improving the morale of the caretakers by bettering the condition of quarters and living conditions, encouraging farming and the keeping of live stock where practicable, improving messes, and, last but not least, installing a radio at each isolated post.

To place a battery or other installation in condition, or to clean up after a severe winter or heavy storms, it may be found necessary to combine all caretakers in one detail, augmented, possibly, by personnel from a garrisoned post. Such a detail will very likely accomplish more and better results under the direct supervision of a commissioned officer.

Some installations normally found at Coast Artillery posts, such as barracks, quarters, and shops, have not been mentioned herein. The armament and the equipment for serving it are our particular care, but, in the caretaking of the installations not mentioned, the ideas presented herein should be of some assistance.

The true value of military training is that it establishes intimate association, acquaintance and comradeship amongst boys of every class and grade of our people, and makes the rich and the poor, the rural and the urban, the native and the foreign know and understand each other as nothing else will.—R. S. Lovett, Chairman, Executive Committee, Union Pacific Railroad.

The Care of Seacoast Armament and Its Relation to the Mission of the Coast Artillery Corps

By LIEUT. EDWARD BARBER, C. A. C.

THE importance of the proper care and preservation of the large amount of seacoast armament "out of service" has, in the past, been either underestimated or entirely overlooked. The scramble for high scores in target practice and the endeavor to develop and maintain model organizations have undoubtedly required the major portion of every commander's attention. The recent inspection reports of technical personnel of the Signal Corps and Ordnance Department have been viewed by the War Department with considerable alarm, as they have indicated that Coast Artillery equipment has not been maintained in the desired condition. A re-statement of War Department policy relating to this equipment has resulted, and is expressed in no uncertain terms.

Before considering this policy, the present situation of the Corps, with respect to the care of its armament, should be examined. Consider, as a typical example, an average Coast Artillery District within the territorial limits of the United States. The one under consideration has four "active" and two "inactive" harbor defenses representing a total of twenty-six different forts. There are about eighty-five seacoast batteries of all calibers "in commission," or about two hundred guns, with all accessories, fire-control communications, command and observing stations, and ammunition. Of course, in addition, there are within each harbor defense barracks, quarters, storehouses, varying amounts of water transportation, and a certain number of mobile guns that are not in use and require maintenance.

The geographical location of these installations has a decided effect upon the situation. To the average observer, it seems that the primary consideration in siting seacoast armament has been to select a convenient island or narrow strip of mainland, readily accessible by means of water transportation only, and then proceed with the construction of batteries and various other installations required for the complete military village. With no desire to discuss the merit of the present siting of armament, the fact that the Corps must resort to the use of boats in order to care for about ninety per cent of its installed armament is deplorable. This is quite a factor, especially since harbor boat transportation has become a large-sized target for the economy experts to shoot at. This is quite justified when it is considered that the money spent annually in operating one harbor boat will feed, clothe, and pay about fifty soldiers for the same period of time.

In regard to troops, there are twelve "active" Regular Army Coast Artillery Batteries in the District, two of which are skeletonized and assigned to "inactive"

harbor defenses and one other assigned solely to special development work. The average authorized strength is seventy men each, the actual strength being somewhat below this number. Seven batteries have primary assignments to guns of the various calibers, but due to their small strength are unable to man all elements to which assigned. A list of the various activities ~~that~~ these troops are required to carry on is most impressive. Among the more important are:

1. Conduct of small-arms target practice.
2. Maintaining highest standards of appearance.
3. Maintaining proficiency in individual military subjects.
4. Maintaining trained manning details for elements to which assigned.
5. Maintaining proficiency in drills and ceremonies.
6. Furnishing labor required for the majority of ordinary post maintenance.
7. Care of armament and barracks to which assigned.
8. Conduct of Coast Artillery target practice.

Recent regulations relating to annual target practice have imposed requirements that are sometimes difficult to meet. In the endeavor to man and fire two guns per battery, there has been at least one instance of combining the personnel of two organizations so as to fire a gun practice in the morning and a mortar practice in the afternoon. Coast Artillery Memorandum No. 8, 1928, lists one organization as conducting a 3-inch antiaircraft gun practice on June 3 and a submarine mine practice on June 30. In a good many instances, even Headquarters Batteries, normally considered special-duty regimental organizations, have been required to conduct major target practices. Officers who have served with troops under present conditions do not wonder that the only time the average soldier has to polish his own equipment is at night, a time presumably reserved for recreation and rest.

Last, but not least, is the care and preservation of "out of service" installations. Assuming that the eight hundred enlisted men of all grades, present in the typical district, are all available for caretaking, there are about two men available for each of the two hundred seacoast guns installed, after deducting those necessary for care of other installations. In other words, every two men, in addition to being armed with rifles or pistols, are also armed with a seacoast gun which requires considerable care and attention. In no other branch do the same conditions prevail. The excess equipment has invariably been disposed of by sale or transferred to a supply branch for storage. However, there is no one supply branch of sufficient strength to take over the preservation of installed seacoast armament and its various accessories. The fact must be accepted that the Coast Artillery Corps must care for its "out of service" installations with little outside assistance.

There is a belief prevalent in certain quarters that fixed seacoast armament is a thing of the past and that our harbor defenses should be abandoned. This belief is no doubt inspired by an observation of present day "big" business methods. When large corporations reach the conclusion that certain of their elements are behind the times, they do not moan over the money that has been

put into these elements. At one "fell swoop" they usually eliminate the older things and replace them with newer and more efficient things, carrying out the old adage—"Off with the old, on with the new"—without quibbling. They have evidently found this procedure to be a distinct advantage, resulting in economy and greater return on investments. It is well known that in New York City buildings costing several millions of dollars are, after less than ten years of service, being replaced with bigger and better structures at a surprisingly rapid rate.

However, in spite of the fact that the development of heavy mobile artillery has practically ended any further installation of fixed armament, our present harbor defenses have considerable value. They protect important localities and are strong points along our coast line which should help to restrict the operations of a hostile expedition to unfortified and, in the main, unfavorable localities. History tells us that almost every encounter between ship and shore has resulted somewhat disastrously for the ship. The Dardanelles campaign is a recent example often referred to. It is noteworthy that during the Joint Army and Navy Exercises at Narragansett Bay in 1927, the hostile battle fleet remained well outside the limit of gun fire of the harbor defenses. The batteries cannot be dismantled nor can the harbor defenses be abandoned, if for no other reason than the fact that a sufficient quantity of suitable mobile armament does not exist. Further, there exists an obligation to the taxpayers, whose money paid for the construction of these batteries, to keep them in the best condition possible, so they may serve the purpose for which they were installed. A gun installed is serving its purpose if it is capable of being fired when needed.

Having indicated briefly that the large amount of "out of service" installations must be maintained by the Coast Artillery Corps, a study of some of the methods now employed in accomplishing this work is in order. The care of armament and equipment has quite properly been made a responsibility of the harbor-defense commander. This, of course, gives rise to the employment of various and widely divergent methods. Present regulations prescribe that Fort Ordnance Officers are responsible for the property pertaining to batteries "out of service" and Fort Artillery Engineers are responsible for the condition of fire-control communications, power plants, and searchlights. One of the missions of a Headquarters Battery (HD) is to provide personnel for the maintenance and administration of forts on a caretaking basis. The 1914 edition of Coast Artillery Drill Regulations contains a brief section devoted to "Caretaker Detachments," parts of which are quoted herewith.

The care and preservation of all ordnance property will be in the charge of an ordnance sergeant when practicable.

The care and preservation of all engineer and signal property will be in the charge of an electrician sergeant when practicable.

The general protection . . . will be in the charge of a non-commissioned officer of Coast Artillery, who will also be in command of a detachment of privates of Coast Artillery detailed to assist the ordnance sergeant

The composition of Coast Artillery detachments . . . will be determined on the following basis: one private to every two guns of five-inch or greater caliber; one private to every two mortars; one private to each rapid-fire battery of four guns or less below five-inch in caliber; *provided*, that in no case . . . less than one non-commissioned officer and three privates.

The foregoing regulations undoubtedly form the basis for the system most used in our "active" harbor defenses in the United States at present. It contemplates the detail on special duty of from four to sixteen or twenty enlisted men from the headquarters battery, depending upon the amount of armament. These are usually divided into Ordnance details and Artillery Engineer details, each particular staff officer concerned being responsible for the property pertaining to his branch.

Under present conditions, this is unsatisfactory. It necessitates dual responsibility, makes the caretakers subject to the orders of several different officers, each of whom is quite humanly prone to give his own activity priority. It burdens several Harbor Defense Staff Officers with frequent visits of inspection (since there are usually no Fort Staff Officers). It does not provide for a systematic care of Quartermaster installations, nor does it secure concerted and coordinated effort in maintaining the other installations. Probably the worst feature is the violation of the principle of economy of force. In time of peace, with the Coast Artillery Corps at such reduced strength, it is paramount that our small organizations have available for active duty and training, under their battery officers and noncommissioned officers, the maximum number of men. The dissipation of energies on activities such as caretaking, which in no way contribute toward building up a well-trained, well-disciplined, efficient force of fighting men, should be reduced to the absolute minimum. The more we reduce the number of men on special duty, the more we are strengthening our combat organizations.

A system which has produced very good results in maintaining "out of service" armament has been observed in some of the foreign-service garrisons. Each organization has been given two or three assignments to armament; one, a primary for target practice, and the others, secondary, for maintenance, thus making each battery commander, under supervision of the battalion commander, responsible for care of a portion of the "out of service" armament. The success of such a system depends mainly on a close grouping (geographically) of assignments or an adequate harbor boat service and a personnel strength of almost fifty per cent of that required for manning the harbor defenses at war strength. Its employment within the United States would, of course, be out of the question, due to the reduced strength, the large number of island forts, and the greatly curtailed harbor boat service.

In a letter dated July 26, 1928, the War Department prescribes the "Policy as to Coast Artillery Equipment," extracts of which are quoted.

2. Certain forts and harbor defenses have, of necessity, been placed on a caretaking status due to the present reduced strength of the Coast Artillery Corps, but these fortifications are not (except as announced by the War Department) to be con-

sidered as subject to probable abandonment, and every effort will be made to maintain them in such condition as to insure full operation without delay in case of threatened emergency. A caretaking detachment of Coast Artillery personnel has been assigned to each inactive harbor defense for the purpose of keeping the entire equipment, as installed, serviceable and intact. While the batteries pertaining to inactive fortifications are out of service (Pars. 41 and 43, T. R. 435-220), the harbor defense commander concerned will make such regular inspections as will insure the keeping of all equipment of the seacoast and mobile armament assigned to his command in condition for prompt restoration to an active status.

3. Fire-control equipment will not be removed, *either temporarily or permanently*, from assigned stations for *any purpose*. Corps area and department commanders are authorized to make specific exceptions to this general policy, in cases of *inactive harbor defenses only*, where climatic conditions or locations are such as to require the removal of such equipment for storage in order to prevent serious deterioration or theft. Whenever such action is taken under this authority, a report of the case will be made to the War Department in order that the actual situation may be of record. All fire-control equipment removed for storage under the authority indicated above will be reinstalled in operating condition in its assigned location once each year for technical inspection at such time as may be designated by the corps area or department commander unless such reinstallation is waived in a specific case by the War Department as a result of exceptional conditions.

This policy is clear and, in a measure, drastic. In order to present a closer view of the result of a strict interpretation of this policy, a partial list of the routine caretaking requirements, gleaned from existing regulations, is presented.

Breechblocks for batteries in service should be dismantled twice a year and before target practice and once a year for batteries out of service. (Par. 43 *b* (13) (c), TR 435-220.)

In general, three coats of paint should be given guns and mortars the first year they are mounted; thereafter one or two coats annually will suffice the actual needs, depending upon the climate and local conditions. (Par. 43 *b* (5) (a), TR 435-220.) The number of coats of paint required for carriages is the same as that for guns and mortars. (Par. 42 *b* (6) (a), TR 435-220.)

Guns should be tripped, elevated, depressed, and traversed between limits once a week. Barbette guns, except those mountd on 12-inch M1917 and all 16-inch, should be withdrawn to normal recoil every three months. (Par. 43 *b* (10), TR 435-220.)

Breech mechanisms should be operated once a week. (Par. 43 *b* (16) (a), TR 435-220.)

Mortars should be retracted and released several times prior to service target practice. (Par. 29 *c* (4), TR 435-220.)

Electric motors should be operated weekly. (Par. 43 *b* (11) (f), TR 435-220.)

Recoil cylinders should be cleaned twice a year. (Par. 43 *b* (12), TR 435-220.)

Mortars should be dismounted every two years. (Par. 43 *b* (11) (i), TR 435-220.)

Open drains and gutters should be swept weekly. (Par. 43 *a* (2), TR 435-220.)

Water fixtures should be inspected weekly. (Par. 43 *a* (3), TR 435-220.)

All light and power equipment should be operated once a month. (Par. 43 *a* (9), TR 435-220.)

Ammunition service apparatus should be operated once a week. (Par. 43 *a* (10), TR 435-220.)

Storage places for powder and explosives should be inspected monthly. (Par. 44 *a* (1), TR 435-220.)

Temperatures in powder magazines recorded daily during periods of excessive heat. (Par. 44 *a* (12), TR 435-220.)

Cases containing smokeless powder should be tested annually to determine efficacy of hermetic seal. (Par. 2 *c* (3), OFSB No. 3 C 7.)

Test sample bottles of each lot of powder observed daily and fresh strip of paper should be inserted every month. Fresh samples of powder should be taken every six months and once a year for fixed ammunition. (Par. 44 *f*, TR 435-220.)

Monthly tests of fire-control communications should be made. (Chapter XII, SCM No. 8.)

All gasoline and oil engines should be operated once a month. (Par. 43 *a* (9), TR 435-220.)

All cable will be tested annually. (App 4 and 4a, Manual of Submarine Mine, 1912.)

In order to have a standard of comparison of the amount of work entailed by the above requirements, an average post will be considered. On this post we may assume two major-caliber disappearing guns batteries, two pits of seacoast mortars, two batteries minor-caliber guns, two searchlights, four power plants (25 K. W.), the usual buildings, and utilities. It has been the personal experience of the writer that in order to maintain all installations in such condition as to be ready for immediate service, a detachment of two officers and sixty enlisted men is required. This organization could be assigned to a two-gun battery of 3-inch guns for target practice, required to conduct small-arms practice, and have a limited amount of infantry drill without serious detriment to caretaking activities. It must be understood that this detachment could maintain all installations in such condition that, in the event of an emergency, a new organization could arrive at the post, man a battery and its stations, and, by simply removing the preservative coat of lubricant, go into action. It would be utterly impracticable to maintain installations in such condition for an equivalent amount of armament with a lesser number of officers and men. It is apparent, at once, that with the present strength of the Corps, the assignment of a detachment of this size to each fort in a harbor defense is out of the question. The supply problem at once becomes difficult due to inadequate harbor boat service.

Just a casual reading of the normal training requirements listed earlier in the article and also the routine caretaking requirements should be ample to convince anyone of the difficulty in training the Coast Artillery Corps to be soldiers and caretakers at the same time. The strength of the Corps in the United States is such that its full time employment on caretaking would barely suffice to "maintain fortifications in such condition as to insure full operation without delay," as required by the War Department policy. What, then, is the solution?

A reduction in training requirements has been advocated by a good many officers, so as to permit more time for care of equipment. Steps have already been taken in this direction by the modification of regulations for Coast Artil-

lery pertaining to the qualification of gunners and marksmen, wherein an enlisted man, unless drawing pay for such qualification, is required to qualify but once in an enlistment. A further improvement could be made by suitable target-practice assignments. Where there is but one "active" organization within a Harbor Defense (usually a Headquarters Battery), the assignment should be to two 3-inch seacoast guns and no more. Further, no organization should be expected to fire antiaircraft and mine practices within the same year. There has been an increasing sentiment within the Corps favoring a reduction in the amount of close order drill, ceremonies, and other kindred subjects. However, if we are to have excellent soldiers, there must be no lowering of the standards of proficiency in the various subjects which develop military bearing, discipline, morale, and splendid appearance. A well-disciplined, well-trained soldier is infinitely more valuable in an emergency than a caretaker.

A substantial increase in the strength of the Corps would undoubtedly be of benefit, but the futility of hoping for such an increase at the present is so apparent that it needs no discussion.

A policy which requires "fortifications . . . to be maintained in such condition as to insure full operation without delay in case of threatened emergency" anticipates the extreme and most unlikely condition. Can it be possible that, with our military intelligence and secret service departments, our close touch with the trend of international relations, and our well organized news agencies, the people of our seacoast cities could awaken any morning to find that a hostile expedition had landed and begun a victorious conquest of the country? The question of removal of fire-control equipment from stations should be left to Harbor Defense Commanders, subject to the approval of the next higher commanders. While complete removal is neither required nor justified in all instances, in a good many removal would insure better maintenance. The question of deterioration due to moisture has long since ceased to be as serious as the shortage of man power. If removal of equipment from stations to a central storage location will result in better condition and a reduction in time and labor required for its maintenance, thus releasing more men for straight duty with a combat unit, it should be permitted to the fullest extent.

We do not keep our mine fields planted in anticipation of this "threatened emergency" which requires everything else to be maintained in condition for immediate use. It is firmly believed that the reinstallation of all fire-control equipment removed from stations in a harbor defense would take no longer than planting the mine field pertaining to the same harbor defense. Since ample facilities exist at every garrisoned fort for training Harbor Defense manning details, keeping all equipment in the Harbor Defenses intact for this purpose is totally unnecessary. Neither is it necessary to keep equipment installed for purposes of inspection. The opinion of the technical personnel who make the various annual inspections of armament and communications is that removal of equipment and its inspection in a central storage location does not lessen the value of their inspection in ascertaining conditions, but in most cases facilitates

their work and gives a truer indication of the condition of individual parts. A harbor defense is built up as a coordinated whole, as is an automobile. Yet a thorough inspection of a motor car does not consist in merely testing its running qualities. On the contrary, if inspection of its parts proves them to be in good order, it is more than reasonably certain that the car will run. While a running test is highly desirable, it is not considered necessary.

A balance must be struck if we are to continue to have a soldierly Corps. The only thing to do is "to cut the pattern to fit the cloth." Two steps are necessary; first, to reduce the amount of manual labor required for caretaking, and second, which logically follows the first, to reduce the number of caretakers required.

As to the first, a slight relaxation in the requirement, "maintaining equipment in condition for immediate use," would permit us to use the same method employed by the various staff branches in maintaining their surplus equipment. For example, the Ordnance Department has reached some very sound conclusions regarding the care of inactive Ordnance materiel and has published them in the various Field Service Bulletins. These cover in detail the proper steps to be taken in preparing materiel for storage. With the materiel once properly prepared, they further indicate that only the following routine care is required:

- a. Examine piston rods at places covered by packing once every six months.
- b. Clean and recoat traversing rollers every six months.
- c. Traverse and elevate pieces within limits once each month.
- d. Clean recoil cylinders once each year.
- e. Examine fire-control instruments once every six months.
- f. Thoroughly inspect one-half of one per cent annually.

The inspection provision conforms to the present method of inspecting condition of powder, *i. e.*, the condition of a sample is taken as the condition of the entire lot. A comparison of the requirements for maintaining "active" materiel and those for "inactive" materiel should convince the most skeptical that by classifying as "inactive" all armament in a harbor defense that is not to be fired by any of the Army components for peace-time training, the amount of routine work is tremendously reduced. Training Regulations permit a harbor defense commander to declare "inactive" all armament which, in his opinion, will not be needed until M-Day plus three months. This cannot be interpreted to mean that it would take three months' time to prepare "inactive" materiel for use. On the contrary, with any body of troops, assisted by one or two experienced soldiers and an Ordnance Machinist, it should take no longer than a week to prepare a battery for action. The same remarks can be made to apply to Engineer and Signal Corps equipment of the Coast Artillery.

The amount of labor required can be readily reduced by giving careful thought to the matter and by utilizing "short cuts" to attain the same end. Consider the painting of projectiles and number of man-hours spent in the past in accomplishing it. Heavy grease, or similar preservative compounds, would serve the same purpose and would certainly require less labor. The only ob-

jection to be raised against the use of grease is the possibility of dripping during warm weather and making unsightly spots on the concrete floor of the shot gallery. The labor saving certainly justifies the small concession to unsightliness. A careful study will disclose many other instances where methods are susceptible of improvement.

As to reducing the number of men on special duty as caretakers, the best method of accomplishing this is summarily to reduce the number to not less than one nor more than four, depending upon the size of the post. Then the amount of work expected of them should be rearranged so as to be within reason. Under the 1914 edition of Coast Artillery Drill Regulations, caretakers were expected to perform the duties indicated below.

- a. Care, preservation, and protection of all Government property.
- b. General police of the batteries, power plants, observing stations, and other public buildings and their immediate surroundings.
- c. Enforcing the regulations relating to persons coming on Government reservations and visiting or inspecting batteries or buildings. . . . *Coast Artillery materiel at such posts will be required to be maintained by caretakers at the same standard of condition as to appearance and functioning as that assigned to companies.*

With but two or three men as permanent caretakers at a post they should only be expected, first to keep the appearance of the post in general up to the highest standard possible, and second, to be constantly inspecting, on a pre-arranged schedule, the condition of the various buildings and installations, promptly reporting any deterioration they themselves are unable to remedy. They should be furnished with every labor-saving device practicable, such as power grass and lawn mowers, power buffers, polishers, and scrubbers, and spray-painting machines. Their work should be further facilitated by placing all installations in "inactive" storage. All movable property should be concentrated in a central storehouse. The caretaker's quarters should be adjacent to this storehouse. Excess and unserviceable property should be disposed of. The windows and doors of empty buildings, barracks, and quarters, should be battened down with wooden or similarly protective shutters. In other words, everything possible should be done in the beginning to decrease the amount of labor required for routine caretaking.

In the interest of securing high-class men for this duty, their pay should be at least equivalent to that of a Sergeant and they should be paid the regular commutation of rations at one dollar per day, under present rates. They should be furnished a comfortable set of quarters and these should be kept in a state of good repair. If the post is somewhat isolated, they should be furnished means of transportation, either a small boat with outboard motor or a small motor truck.

A general scheme of caretaking has been devised and put into effect in at least one District with such marked improvement in the condition of "out of service" installations in a short time that it may well be considered as being better than any of those used heretofore. The scheme may be equally well

applied to both small and large garrisoned harbor defenses. It is generally agreed that proper maintenance of "out of service" installations depends *primarily* upon *continuous inspection* of equipment and *constant supervision* of caretakers. It must be realized that neither the harbor defense commander nor any member of his staff, as now constituted, can devote the necessary time to secure this close supervision of outlying stations.

In order to provide for this, all the ungarrisoned forts should be grouped and placed under the command of a Coast Artillery officer, who is designated as "Fort Commander," "Outpost Officer," "Materiel Officer," or by some other appropriate title. He should be on the staff of the harbor defense commander and have no other duties assigned. His detail on courts and boards should be held to a minimum. His rank should be appropriate to the number of posts and amount of armament on a caretaking basis. In the larger commands, he might well be a field officer and have one or more junior assistants. In the small commands and with a shortage of officers, the duties of "Officer in Charge of Outposts" might be combined with those of the Commanding Officer of the Headquarters Battery, provided he is given no other duties. There can be no objection raised to the detail of an officer who could devote his *entire time* to the proper supervision and direction of caretaking when it is realized that almost ninety per cent of the batteries *are not manned* but are in the hands of caretakers.

He should be responsible directly to the harbor defense commander:

1. That all batteries are fully equipped with all tools, spare parts, accessories, communications, and fire-control instruments at all times.
2. That all Fort Record Books and Emplacement Books are posted to date.
3. That all equipment is kept in a proper state of police, repair, and preservation.
4. That any excessive deterioration in any structures is promptly reported to the harbor defense commander together with recommendations as to repair and prevention of further deterioration, and that a "follow-up" system is carried out.
5. That the post in general and all buildings, structures, and installations are in a proper state of police.
6. That all storerooms are neatly arranged, and that all property therein pertaining to a particular installation is properly tagged and in good condition.
7. That all installations are annually placed in a condition that will facilitate the regular inspection of the technical representatives of the Signal Corps and Ordnance Department.
8. That the supply of necessary preserving and cleaning materials (obtained from harbor defense staff officers) is prompt and adequate, reporting any inadequacies at once.
9. That the appearance, discipline, and proper utilization of the permanent caretakers and any working details sent to the outposts is up to the required standard. (In effect, he should command all caretakers, all orders being given either by or through the Outpost Officer.)

The Harbor Defense Artillery Engineers and Ordnance Officers should continue their periodic inspections, noting any deficiencies and reporting them through the harbor defense commander to the Outpost Officer, whose duty it is to have them corrected. Each inspection made should have as its mission not only an observation of general conditions but a *specific investigation* of the condition of *certain articles* of equipment or *parts* of installations, different each time, so that during a series of inspections all items will have been covered thoroughly. A list, similar to the Form No. 5, I. G. Dept., and applicable to Coast Artillery installations should be prepared and invariably used when inspecting.

In carrying out this scheme, the first step of the Officer in Charge of Outposts is to make a thorough general inspection of all posts on a caretaking basis, actually listing in detail all items requiring the employment of personnel in bringing equipment and installations to a proper standard of preservation. Then the inspection reports made by the technical representatives of the various staff branches for the preceding three or four years should be studied and the major features of all noted down. Next, all regulations pertaining to care and preservation of equipment and property should be carefully studied and lists made of all routine work required.

After a close analysis of the above, work schedules and task assignments should be prepared for each post and given to each caretaker every week in order to insure profitable employment of each man's time. It has been found that Reminder Lists for caretakers are of value. A sample abbreviated form is indicated below:

REMINDER LIST FOR CARETAKERS

Battery *Smith* Fort *Jones* Harbor Defenses of *Brown Bay*
For batteries "in commission" and either "in service" or "out of service" "active."

| <i>Month</i> | <i>January</i> | <i>February</i> | <i>March</i> | <i>April</i> | <i>May</i> |
|--|----------------|-----------------|--------------|--------------|------------|
| <i>Weekly</i> | | | | | |
| Elevate and traverse guns | 3 9 17 28 | 8 12 20 26 | 4 11 20 28 | 5 10 17 25 | 5 10 18 27 |
| Operate electric motors | 1 8 16 26 | 5 10 21 28 | 2 12 19 27 | 2 8 18 27 | 1 8 19 28 |
| Etc. | | | | | |
| <i>Monthly</i> | | | | | |
| Inspect Powder Magazines | 15 | 14 | 17 | 18 | 16 |
| Operate Gas Engines | 12 | 15 | 16 | 13 | 19 |
| Etc. | | | | | |
| <i>Every three months</i> | | | | | |
| Withdraw barbette guns to normal recoil | March 3 | | June 10 | | |
| Etc. | | | | | |
| <i>Every six months</i> | | | | | |
| Clean recoil cylinders | June 19 | | | | |
| Etc. | | | | | |
| Inspected by HD Comdr. | 6 | 10 | 3 | 14 | 9 |
| Etc. (Other Officers) | | | | | |

INSTRUCTIONS:

This form will be posted in each battery emplacement in a conspicuous place. The caretaker will enter in pencil the date each activity or operation is completed. While the caretaker will be unable to perform all tasks alone, it is his duty to request the necessary assistance. In addition to the above, the caretaker will be constantly alert to detect any deterioration he is unable to remedy, reporting at once to the Outpost Officer. The areas in the vicinity of stations and emplacements will be kept in a good state of police, grass neatly cut, brass polished, and high standard of appearance maintained.

| Caretaker | Name | Rank | Org. |
|-----------|------|------|------|
| | | | |

A similar reminder list can be prepared for use at "inactive batteries."

All outposts should be visited by the Outpost Officer at least once a week when weather conditions permit. All the work that cannot be performed by the two or three caretakers must, of course, be performed by working details. Due to the distance involved it is usually undesirable to send details from the main post daily, as the time consumed in traveling to and from the outposts reduces the working day by half. It is believed that with a normal training schedule, there will be found two or three periods of favorable weather throughout the year of about four to six weeks each when large working details can be sent to the outposts and messes established. The District and Regimental training programs should set aside at least two periods during the year, one in the spring and another in the fall, which will permit the full time employment of the entire command, if necessary, on caretaking. Well planned and carried out, this will eliminate "lost motion" and provide for concerted and coordinated effort in caretaking, with improved results.

The work of the details, aptly called "flying squadrons," should be directed and supervised by the "Outpost" Officer. With a mess established at an outpost, the "squadron" might well include, when necessary, an Ordnance Machinist for armament work orders, a quartermaster carpenter and plumber for repair of Quartermaster buildings, and Engineer Corps employees for structural and non-structural repairs to fortifications.

The scheme as outlined is not proposed as an experiment. It has been thoroughly tried and found workable and furthermore has resulted in an improved condition in the equipment at ungarrisoned Coast Artillery forts. A Coast Artillery officer who serves as "Outpost Officer" for at least one year will gain a much more thorough general knowledge of his Corps and its weapons than is possible under the average assignment.

While the purpose of this article has not been to criticize any particular policy or method, an effort has been made to present a compilation of facts, the viewpoint of various officers, and suggestions for improvement in methods of caretaking. Its purpose will have been amply fulfilled if it contains any suggestions for partially effecting a lightening of the burdens of the Corps or if it results in even a slight decrease in the number of men on duty away from combat organizations.

Imperial vs. National Sea Power

By CAPTAIN GEO. J. B. FISHER, C. A. C.

EVERY sincere proponent of Anglo-American friendship must listen with regret to some utterances of leading personages on both sides of the Atlantic on the subject of naval armaments. We appear to be approaching the predicament of the two neighbors who became enemies after a prolonged and fruitless argument over the merits of their respective plumbing installations. There are some utilitarian appurtenances to civilization that are strictly personal, about which acrimonious discussion serves no good purpose. In this category are British and American cruisers.

After much talk, which is evidently leading nowhere, it is time to ask, Who started this argument, anyway? Historically, the United States must accept the responsibility for calling the Washington Conference of 1921; but, despite the outward facts, the real initiative was not wholly in Washington.

In March, 1920, the First Lord of the Admiralty announced that Great Britain would consider a one-power navy. By this he meant that the Mistress of the Seas was willing to see another ascend to her rank in naval power. Presumably the historical significance of this pronouncement did not register in the United States. So, a few months later this same official took occasion, in addressing Parliament, to remark that the British Government hoped to receive an invitation from Washington for an arms limitation conference.

Expressive propaganda commenced to appear, urging a reduction of naval strength. So active was this propaganda that the Naval Secret Service was obliged to report on it; and Mr. Harding, shortly after, took occasion to denounce publicly the covert attempts of foreign governments to influence domestic policies. However, the Washington Conference assembled in November, 1921, at the formal invitation of the United States; and Great Britain was wholly satisfied with the proposal of Mr. Hughes for theoretical naval parity.

The subsequent Geneva Conference of 1926 was merely an attempt to settle the unfinished business of the Washington Conference. It was assumed in the United States that the naval parity already agreed upon meant naval parity, not dreadnaught parity. It was supposed that a lapse of five years had afforded opportunity to find answers to the complicated questions of cruisers and submarines which the Washington Conference had been obliged to lay over; but it developed that five years, on the contrary, had merely served to emphasize the differences of the two nations on these issues.

As the Geneva Conference adjourned, each nation tacitly bowed to the necessity for following its own natural course in building non-capital ships. The delegates of each nation parted with a better understanding of the naval problems of their conferees and, understanding them, realized that further

limitation was impracticable. Our idealistic aspirations had encountered material facts which it was impossible for them to surmount.

It is now clear that the defensive armor which fits the British Empire is grotesquely misfitting to the United States. Similarly, the American suit of mail is quite inadaptably to British embonpoint. This is naturally so because of the structural variations of the two powers.

Each represents a fundamentally distinct political concept. Great Britain is the modern, glorified embodiment of the Empire. The United States exemplifies the plenary development of the Nation. That the two are dissimilar does not argue that the two are inimicable. That each insists on a defensive armor appropriate to the body which political evolution has provided, is a matter of common sense and should give rise to neither apprehension nor recrimination.

To apply the jargon of the economist, the British Empire is organized on the horizontal principle; the United States on the vertical. Both seek, in the remaining unindustrialized portions of the world, an exchange of raw materials for finished products. The British Empire (or Commonwealth of Nations, as it is now styled) pursues this end primarily by free trade among its political components. The United States follows more especially the theory of mutually advantageous trade in other world markets.

The British Empire comprises, roughly, an eighth of the habitable areas of the globe. Its dispersion and lack of homogeneity would at first glance seem to indicate a lack of political cohesion. That the contrary is true is a tribute to English governmental genius.

The tenacity of the British Empire may be traced to the fact that the empire is of real value to the states which compose it. Whereas the British Isles originally exploited their dependencies, the situation is now quite reversed. A common pooling of economic interests safeguarded by adequate naval power, combined with a modicum of self government, presents the political equivalent of a powerful horizontal cartel. This structure is and must be largely supported by British sea power. The British Navy, challenged in turn by Spain, Holland, France, and Germany, but never defeated, is a considerable insurance at moderate cost for such states as Australia and the Union of South Africa.

But Downing Street realizes well enough that past glories alone do not guarantee the security of the modern British Commonwealth. Especially is the British Government sensitive to the least suggestion of senility. Its very existence demands a steady manifestation of virility, of ability to keep abreast of the present. Its far-flung empire is knitted together by ships, merchant and naval, and its paramount duty is to maintain adequate quantities of each.

In non-capital ships, Great Britain is partial to the cruiser and detests the submarine. This policy is clearly appropriate to her own peculiar naval problems. It coincides with the attitude of the United States in general, but not in particular.

In cruisers the British require quantity and, if any limitation is to be imposed, are obliged to sacrifice size. The United States is unable to sacrifice size for the very good reason that a cruiser with limited cruising radius is of

no value to us. These irreconcilable positions follow from cold geographical facts; the British have a world-wide empire, comprising innumerable naval havens from which small warships can operate, while the United States occupies a compact land area, virtually without overseas bases.

The inevitable conclusion is, therefore, that a sound basis for cruiser limitation between the two powers is nonexistent. But the fact that a mutually satisfactory schedule for limitation of this class of ship is lacking does not imply that the two nations are building competitively as they develop their cruiser programs. To some extent even the reverse may be inferred, since the large cruiser desired by the United States and the small cruiser favored by Great Britain are not tactically antagonistic. Certainly there is good ground for hoping that the purposes which they serve will never involve direct combat.

The British Empire, penetrating as it does every quarter of the globe, is sensitive to all the stresses and strains of international affairs. It is indispensable that the imperial lines of communication be kept open at all times and at all odds. Unfortunate though it may be, the only certain means of achieving this end is by having at hand adequate sea power to repress instantly any attack.

The naval needs of the United States, on the other hand, are in some measure fulfilled by the "fleet in being" rather than by the "fleet in action."

Our international interests are not of such a nature as to render the United States liable to attack from many quarters. While the seeds from which wars spring are innumerable in the case of the British Empire, they are much fewer in the case of the United States. The primary function of the American navy is of course to repulse attack, but its very important secondary function is to afford foreign policies that material support which renders them authoritative.

Especially is this support necessary when the United States engages in the rôle of neutrality. We were buffeted about during the Napoleonic era, and even had to fight England, because our naval strength was insufficient to command respect for our commerce on the high seas. And we were brought into the World War because there was no cold steel behind the famous notes of 1916. There is no reason to suppose that in future wars, even though we avoid participation, our diplomatic remonstrations will be taken seriously without adequate sea power in the background.

Peacetime as well as wartime diplomacy has in the past reflected very directly the adequacy of the American navy. Fifty years of effort failed to bring about an abrogation of the Clayton-Bulwer Treaty, yet the naval efficiency demonstrated during the war with Spain was quickly followed by a satisfactory adjustment of vexing Central American problems. The vigorous foreign policies of Mr. Roosevelt would have involved war had they not been supported by tangible strength afloat.

It is therefore a fairly accurate generalization to state that, while the British navy exists to fight, the American navy exists to avoid fighting. But each requires a proportionate strength to accomplish its mission.

As these two navies increase in strength, there is always at hand the professional alarmist with his dire predictions of coming war. The possibility of

armed conflict between Great Britain and the United States, however, is in fact extremely remote.

The British government is, like our own, compounded of statesmen and politicians; except that the statesmen may have a firmer control of affairs in London than is the case in Washington. History during the last two or three decades is replete with incidents which show that the British statesman is actuated by a determination to conciliate the United States. He is often offset by the politician who, to placate the proletariat, may denounce him or even, as in the case of Sir Edward Grey, turn him out of office. Nevertheless, since the days of John Hay and Sir Julian Pauncefote, there has been no occasion seriously to complain of our treatment at the hands of the British. With reasonable steadiness in Washington we need have no fear of a *casus belli* from London.

The real reason for this is two-fold. In the first place the Englishman has a deep aversion to fighting us; not necessarily from fear nor because of past experience, but simply because he does not care to accept the awful gamble which such a fight entails. In the second place, he realizes fully that the British Empire would not survive such an internecine struggle.

Yet, despite his lack of actual enmity, it is no easy matter for the average Englishman to become reconciled to the one-power naval standard to which he was so glibly committed in 1920. He requires time and not a little vociferation before his system will accommodate itself to so radical a variation from the past. As a matter of human equity, he is due the privilege of slowly assimilating the distasteful dose which he is obliged to accept.

The English who govern the British Empire have on occasion been accused of lack of foresight; but never of lack of ability to meet a concrete situation. The tremendous wealth and vitality of the United States of America is one of the outstanding facts of the present era—appreciated less at home, probably, than abroad. The well informed British certainly have a clear understanding of the comparative present and future, and realize that a naval development appropriate to the material prestige of the United States is not to be gainsaid.

It may be that all the plethora of naval limitations from which we have lately suffered came about as a conscious or unconscious effort on the part of Great Britain to evade the essential facts of contemporary history. Encountering an adamant spirit in high places on this side of the Atlantic, however, it is inevitable that British statesmanship will pursue the sensible course and shape policies which will support harmony rather than engender antagonism between the imperial navy and its national counterpart.

Colonial Forts on the Pacific Coast

I. EXPLORATION

THE Western Coasts of North America were, at various times, claimed in whole or in part by Spain, Russia, France, England, Mexico, and the United States. The Spanish, making the original discovery of the Pacific Ocean at Panama, gradually worked their way up the coast, establishing settlements as far north as Nootka Sound, in British Columbia. They did not, however, actively press any claim to territory beyond the forty-second parallel of North latitude. The Russians, crossing to America from Kamchatka, established their southernmost settlement on Bodega Bay, in California, but their recognized southern boundary line rested on the famous "fifty-four forty" parallel. France felt that possession of Canada and of Louisiana entitled her to a place on the Pacific, but the French-and-Indian War practically extinguished her pretensions. After taking Canada from France, England laid claim to all western territory from Russian America to the Columbia River. The United States held that the Louisiana Purchase and original discoveries entitled this country to the shore-line from California to the Russian Province. Mexico succeeded to the Spanish claims in 1821.

Vasco Nuñez de Balboa established the Spanish claim in 1513, when he discovered the "South Sea" and promptly took possession for Spain of the ocean and of all lands and islands washed by it. The voyage of Magellanes in 1519-22 informed the world of the vast extent of the Pacific, which was in fact a Spanish ocean for a great many years. The efforts of Cortes early secured Mexico and Lower California for Spain, and started the voyages which led to the discovery and settlement of Upper California.

In 1542 Juan Rodriguez Cabrillo discovered San Diego Harbor and sailed along the shores of Alta California as far as Cape Mendocino. He died in January, 1543, and his chief pilot, Bartolome Ferrelo, continued the explorations as far as the vicinity of Cape Blanco, in Oregon, where he turned southward and returned to Navidad, in New Spain. Juan de Fuca, according to somewhat doubtful evidence, sailed further north in 1592 and discovered the strait which bears his name. In 1602-03 General Sebastian Viscaïno explored the coasts, entered the harbors of San Diego and Monterey, and reached the forty-third parallel of latitude. In the sixty ensuing years the Spanish made twenty or more voyages of exploration along these coasts under the impression that valuable minerals and precious stones were to be found; but we hear little from this territory for more than a century and a half after Viscaïno visited its shores.

In 1774 Ensign Juan Perez explored southward from fifty-four degrees North latitude to Monterey and discovered San Lorenzo Harbor, which afterward became known as Nootka Sound. The following year Captain Bruno Heceta, in the Corvette *Santiago*, and Juan Francisco de la Bodega y Quadra,

in the small schooner *Sonora*, sailed on another expedition of exploration, Quada reaching the fifty-eighth parallel before sickness among the crew forced his return. In 1788 Estevan Jose Martinez, in the corvette *Princessa*, and Lieutenant Gonzalo Haro, in the schooner *San Carlos*, proceeded to the sixtieth parallel of latitude, and thence southwestward as far as Unalaska, examining the Russian settlements in that part of the world.

The English flag made its first appearance on the coast in 1578, when Francis Drake made his famous buccaneering expedition along the Spanish Main. Sighting land in the vicinity reached by Ferrello, Drake turned south and put in at Drake's Bay, near Point de los Reyes. Here he brought his ship to anchor near the shore, and landed men to set up tents and build a barricade around them. Having provided a suitable defense, he disembarked, stored his cargo within his fort, careened the ship on shore, and set to work overhauling and repairing damages. During his short visit to the country, which he named New Albion, Drake took possession in the name of his sovereign, but after thirty-six days spent in preparing the *Golden Hind* for further sea service, he abandoned his fort and set sail on the long homeward voyage.

Not until 1778 was England again represented on the Pacific Coast. In that year Captain James Cook did some excellent geographical work from Nootka Sound through Bering Strait to Icy Cape, in the latitude of seventy degrees twenty-nine minutes. In succeeding years the British flag was flown along the shores by Vancouver, Meares, Portlock, Dixon, and many other traders and navigators; the French flag by Prouse; and the American flag by Kendrick, Gray, and others. All along the northwest coast, traders of many nations appeared, and before long the Pacific shores were well known to the navigators of the world.

Meanwhile the Russians had come from the Northwest. In 1728 Vitus Bering sailed through the strait which bears his name and proved that Asia and America were not united. In 1731 Gvozdoz was blown ashore on the American coast near Norton Sound. In 1741 Bering and Alexei Illich Chirikof explored the southern shores of Alaska. Chirikof reached Sitka and returned to Kamchatka; Bering saw and named Mount Sitka, and wintered on Bering's Island where he died. Voyages by Emilian Bassof, Mikhail Nevodchikof, Andrei Tolstykh, and others in the ensuing years, and explorations by Synd, Krenitzen, and Levarschef between 1766 and 1769 added to the information concerning the Alaskan coast and established the Russian claim to that part of America.

II. CALIFORNIA

The Spanish court recognized the importance of the permanent occupation of California, but troubles both at home and abroad rendered postponement unavoidable. Spurred at last into action by the advance of the Russians from the north, Spain finally determined to secure the coasts to the north of New Spain. In 1768 the Marquis de Croix, Viceroy of New Spain, instructed Don Jose de Galvaez, Visitador General of New Spain, to occupy and fortify San

Diego and Monterey. By July, 1769, a settlement of one hundred and twenty-six persons had been made at San Diego, the defenses consisting at first of but a palisaded enclosure. In the summer of 1770 Monterey was established from San Diego, and the harbor of San Francisco was discovered by Don Gaspar de Portola, Military Governor of California.

The Spanish occupation was both military and religious in character. The settlements consisted, for the most part, of missions to which detachments of a corporal and two or three men were attached. To protect the missions and to secure the country against invasion, the frontier was guarded by a line of forts or, as they were called, presidios. The provision of a system of regular defense against foreign invasion by way of the seacoast was found to present considerable difficulty. A distant province, with no resources of its own, could scarcely maintain extensive fortifications, so it was decided to provide each coast presidio with a battery of eight 12-pounders, manned by a small detachment of artillerymen, as protection against corsairs and privateers.

The early presidios were usually of temporary construction and were improved from time to time. The batteries supporting the coast presidios were half-finished or half-decayed structures, called forts or castillos, to each of which half a dozen soldiers were detailed. Duffot de Mofras says:*

All of the presidios were established on the same plan. Choosing a favorable place, they surrounded it with a ditch twelve feet wide and six feet deep; the earth of the ditch served as an outwork. The enclosure of a pueblo was formed of a quadrilateral, six hundred feet square. The rampart, built of brick, was twelve feet high by three in thickness; small bastions flanked the angles. Its armament consisted of eight bronze cannon; eight, twelve, and sixteen pounders.

Although incapable of resisting an attack by ships of war, these fortifications were sufficient to repel the incursions of the Indians. Not far from the presidios, according to the topography of the land, was an open battery, pompously styled the castle.

In California there were four of these presidios along the coast—one at San Diego, one at Monterey, one at San Francisco, and one at Santa Barbara, the chief harbors of the province. Each was protected by high adobe walls on which a few small guns were mounted, but the garrisons were small and were rarely to be found within the fortifications. Under the Spanish system, one part of a fortification could fall into decay while another part was being repaired, so it is safe to say that none of the presidios or their attached forts were ever really in condition for service.

The Presido of San Diego, established in 1769, was located at one of the most important points in Alta California, but it was, nevertheless, always a weak fortification. Vancouver, who visited the presidios in 1792-93, says:†

The presidio at San Diego seems to be the least of the Spanish establishments. It was irregularly built, on very uneven ground . . . With little difficulty it might be rendered a place of considerable strength by establishing a small fort at

* Vide Blackmar, *Spanish Institutions in the Southwest*,

† Op. cit.

the entrance of the port; where at this time there are neither works, guns, houses nor other habitations nearer than the presidio five miles from the port and where they have only three small pieces of brass cannon.

Of the Presidio of Monterey, which had been established in 1770 and had not been greatly altered, Vancouver said that the buildings formed a parallelogram three hundred yards long by two hundred and fifty wide. At each corner was a small bastion, which projected a little beyond the wall. Before the entrance, which faced the bay, were four 9-pounders and three 3-pounders, all of these guns being on the ground without fortification. They were so far from the water and so poorly protected that they accomplished nothing as a means of defense. Nevertheless, the central location of Monterey made it a station of great military importance, and for a long time it was the capital of the province.

The Presidio of Santa Barbara was established in 1782, but no fort was ever built there and no artillerymen were detailed to man the occasional gun to be found at that station.

The Presidio of San Francisco was dedicated in 1776, but when Vancouver entered the bay in 1793, he was saluted by a brass 3-pounder tied to a log. He says that he saw another cannon mounted on a decayed carriage in front of the presidio. Later, however, Fort Point, was occupied, and in the course of time Fort San Joaquin was put up, although its construction was faulty and it was practically useless as a means of defense.

In 1772-73, after the establishment of the Presidio of Monterey, the military establishment of Alta California was reorganized according to a plan developed by Juan José Echeveste. The Californian army thus established provided commandante, a sergeant, two corporals, twenty-two soldiers, two carpenters two blacksmiths, four muleteers and a storekeeper at Monterey; and two sergeants, two corporals, twenty-two soldiers, two carpenters, two blacksmiths and a storekeeper at San Diego. For the five missions then existing in Alta California (San Diego, San Carlos de Monterey, San Antonio de Padua, San Gabriel, and San Luis Obispo), the project provided five corporals, and twenty-five soldiers.

In 1776 Lieutenant José Joaquín Morega, pursuant to orders from Viceroy Bucareli, proceeded to San Francisco and established the Presidio of San Francisco. Arriving at Fort Point, Morega declared the site suitable for a presidio and a fort. His expedition, consisting of Fathers Benito Palou and Pedro Benito Cambon, Sergeant Pablo Grijalba, two corporals, sixteen soldiers, seven pobladores or settlers, and the families of the enlisted men and the pobladores, pitched their tents late in June on the bank of the lagoon known as Nuestra Señora de los Dolores. On the eastern slope of the hill or point forming the southern side of the Golden Gate, Morega selected for the presidio a site within view of the entrance of the port and not far from the place where the fort was to be constructed. The initial armament for these defenses consisted of two swivel guns brought from Monterey by boat.

As late as 1777 the presidios were mere huts within frail palisades, but a year later Monterey was protected by a stone wall five hundred and thirty-seven yards in circumference, four feet thick, and twelve feet high. In San Francisco, adobe walls were being built, but they were destroyed in the winter of 1779 by heavy rains. Santa Barbara was added to the list of presidios in 1782 by Governor Felipe de Neve. This establishment was located on a plain sloping gradually to the sea, directly in front of the roadstead, and near an eminence suitable for a fort.

Governor José de Arrillaga arrived in Alta California in 1792 and proceeded to inspect the presidios and forts. He found that the colony was entirely defenseless and could offer no resistance to an armed vessel entering any one of the ports. At San Francisco there was but a single gun of small caliber and of questionable serviceability. At Monterey there was some ordnance left there by Bodega y Quadra the preceding year, but there were no gunners to man the batteries. Santa Barbara and San Diego were in somewhat more habitable condition than the others. Arrillaga saw that he must look to his defenses.

After ordering the repair of the other presidios, Arrillaga proceeded to San Francisco in August, 1793, and selected, as the site for a fort, the bluff forming the extreme northern point of the peninsula of San Francisco and the southern side of the Golden Gate, later named Fort Point. Finding none of his own people who were qualified masons, he was forced to employ one Toribio Ruiz, a roving journeyman who had drifted into Monterey the preceding year. Under Ruiz as architect, superintendent, and builder, the fort was constructed, and in it were placed eight brass 9-pounders that had come from San Blas this same year. The fort, completed in 1794 at a cost exceeding six thousand dollars, became known as Fort San Joaquin.

Diego de Borica succeeded Arrillaga as governor in 1794 and found that very little had been accomplished toward improving the condition of the coast defenses of the country. San Francisco and Monterey had a few guns, but the rest of the province was defenseless. The governor's anxiety was increased because Spain had declared war on France in 1793 and he feared an invasion by the French. He had only about two hundred and seventy-five soldiers in the colony—some sixty at each of the presidios of San Diego, Santa Barbara, and Monterey, thirty-six at San Francisco, and the rest scattered among the several missions. This force was strengthened in 1794 when Viceroy Brancifort ordered from San Blas to California a company of Catalonian volunteers for general service and a detachment consisting of one sergeant, three corporals, and fourteen artillerymen to man the batteries at San Francisco and Monterey. At the same time, the Marine Department, directed by the Viceroy, sent the *Concepcion*, a small war vessel, to assist in guarding the coasts of California.

In 1796 Alberto de Cordoba, a military engineer, inspected the three fortified presidios and declared the works at these places entirely useless. At Monterey, vessels could easily anchor and land men out of range of the guns

of the battery, which consisted of a few logs, irregularly placed, behind which stood about eleven guns. At San Francisco only two of the guns could send a projectile entirely across the entrance of the bay, and then only when elevated to an angle which destroyed precision of fire. The horseshoe-shaped fort, its walls of adobe and its embrasures of brick, mounted eight guns, but of the three 24-pounders which it possessed, one was unserviceable. The remaining guns were so poorly mounted as to afford little or no protection against attack. Point Guijarros, at San Diego, had been chosen in 1795 as the site for a fort of ten guns, but the works were not completed until after 1800.

Cordoba at once started upon the more pressing repairs and improvements at Fort San Joaquin. After preparing the project of rehabilitation there, he was called to do the same for the presidios of San Diego and Santa Barbara. In the spring of 1797 he was ordered back to San Francisco by Governor Borica to take charge and to hasten the repairs and improvements at the fort and also to construct a battery so sited as to prevent the occupation of the anchorage at Yerba Buena. This battery, which was built on Point Médanos (Point San José, Black Point) and which was called the Bateria de la Yerba Buena, was a less elaborate work than San Joaquin, being constructed largely of brushwood fascines, with eight embrasures and five 8-pounder cannon. No garrison was kept here, but the work was visited daily and, to some extent, kept in order.

In this same year, Borica also had a battery built at San Diego on Point Guijarros (Loma). This work was an earthwork with a plank-and-stone magazine in the rear and with an armament consisting of eight brass 9-pounders in serviceable condition. As the fort was at some distance from the presidio, the soldiers assigned to the guns were seldom to be found at the battery.

In the spring of 1803 Captain William Shaler, in the brig *Lelia Byrd*, entered the harbor at San Diego to trade for otter skins. As such trade was forbidden to foreigners, the commandante of the presidial establishment, Don Manuel Rodriguez, directed Captain Shaler to put to sea as soon as he had obtained some necessary supplies. An attempt at surreptitious trading was discovered by Rodriguez, who was so incensed that Captain Shaler deemed it prudent to put to sea at once, particularly since his vessel carried but six 3-pounders, far inferior in both range and power to the guns in the fort.

The brig, in running for the entrance to the harbor, would have to pass the fort at close range, so the Spaniards manned their guns and opened fire. As the vessel drew abreast the fort, the little 3-pounders replied valiantly to the fire of the heavier guns. At the first volley, the townspeople, who had assembled to see the fight, fled from the vicinity of the fort; at the second volley, the artillerymen deserted their guns with equal expedition, with the exception of one man who stood on the parapet waving his arms to signify that the battle was over. The combat, or at least the firing from the fort, had lasted three-quarters of an hour, but the brig successfully ran past and drew out of range. There is no record that any blood was shed in the exchange of fire, but the *Lelia Byrd* was considerably damaged and had to put in at San Quentin for repairs.

When Governor Borica left Alta California in 1800, Arrillaga became governor for the second time. As before, his first care on assuming office was to inspect the various presidios and military establishments, and, as before, he found them in what he called an unhappy and deplorable state. There was a battery at Yerba Buena, one at San Francisco, one at Monterey, and one at San Diego; but they amounted to very little for defensive purposes. Not only had no substantial repairs been made for a number of years, but several severe storms had caused great damage. There were but eighteen artillerymen assigned to all the batteries of the province; and not one of the works could successfully have resisted a single ship of war. In 1805 coast defense once again became the subject of deliberation at the capital in Mexico.

At San Francisco, a hurricane of wind and rain in the winter of 1798-99 had battered down the adobe walls of the fortifications there; and in February, 1802, another furious storm completed the destruction of the defenses and ruined the ordnance. Some repairs were effected in this year, but in 1805, following a third storm in 1804, Fort San Joaquin was provided with three sides of stone and one of palisade and with a new casemate three hundred yards away. All the work was done by Indian convicts, and we may assume that it was but indifferently performed. In July, 1805, Arrillaga reported that Fort San Joaquin was well located but needed repairs. At that time but three of the ten guns of the fort were in good condition.

The storm of November, 1804, leveled the palisade which enclosed the battery at Yerba Buena and did other serious damage. Commandante Arguello decided that the battery ought to be relocated on the hill nearer the anchorage, perhaps the slope of Telegraph Hill.

At Santa Barbara, the buildings were in a somewhat better condition, but there was only a single cannon. In 1806 the presidial artillery consisted of eight guns from one to six-pounders, of which half were distributed among the missions. Shaler, who visited the presidio about this time, said that Santa Barbara "has only the show of resistance and would fall an easy conquest to the smallest ship of war."

At Monterey the condition of affairs was little better. Shaler said in 1805: "There is a miserable battery on a hill that commands the anchorage, but it is altogether inadequate to what it is intended for." There were ten guns from three to eight pounds in size, but they were not in particularly good condition.

At San Diego the situation resembled that at San Francisco, except that the guns on Point Gujarras were serviceable. They were, however, so poorly mounted that they were almost useless. Four or five artillerymen were kept at the fort, and a few minor repairs were effected during the first few years of the century. Shaler said: "There is a sorry battery of eight-pounders at the entrance, at present it does not merit the least consideration as a fortification, but with a little expense might be made capable of defending this fine harbor."

The troops in California were in general an idle and spiritless lot who did little for the province but who were sufficient to keep in check the more idle and more spiritless Indians living near the settlements. There was no longer

any expectation of attack by a foreign power, and the military establishment—men, forts and material—was allowed to deteriorate to an almost useless condition. It can not truthfully be said that California possessed any coast defenses in the years following the opening of the nineteenth century.

In 1812 Governor Baranoff, of Alaska, sent M. de Koskoff with one hundred Russians and one hundred Kodiak Indians to establish a settlement on the shores of Bodega Bay. There a palisaded fort was built in 1813, but in 1820 Fort Ross was built further up, on the cliffs at Sonoma. This fort was a square inclosure with round bastions and with adobe walls twelve feet high pierced with embrasures. At opposite corners were two bastions, two stories high, furnished with six pieces of artillery. This settlement was intended to be a trading post of the Russian-American Fur Company, and here the settlers kept up their hunting and fishing until 1841, when they sold their interests and abandoned the site.

In 1815 Pablo Vicente de Sola became governor of California and, like his predecessors, opened his administration with an inspection of the defenses of the country. The Presidio of San Francisco was in a most acute stage of decay, but the other presidios were in fair condition, although none of them was any more suitable than it had ever been for defense. There were but forty-two cannon in the province, and half of them were useless. Of these guns, not to exceed twenty-two were of sufficient power to have any value in coast defense. These were three 24-pounders, one 16-pounder, five 12-pounders, and thirteen 8-pounders. The remaining twenty were smaller. Fifteen of these cannon, including the 24-pounders, were at San Francisco, twelve at Monterey, seven at San Diego, two small ones at Santa Barbara, and six small ones distributed among the missions.

Shortly after Sola arrived, Lieutenant Luis Antonio Arguello, commandante at San Francisco, decided that he would repair his post without waiting for the unwinding of red tape to secure a permission which might or might not be given. Building himself a launch, he used it to tow redwood logs from Corte de Madiera, twelve miles distant, until he had enough for his purposes. The governor, at Monterey, learned of this activity and became furious, claiming that Arguello was guilty of insubordination in so acting without the knowledge and consent of his governor. Obeying the governor's order, Arguello reported promptly at Monterey where he so impressed Sola by his bearing that the governor withdrew all objections to the work and the two men became fast friends. Later the governor agreed that the repairs to the fort were justified—but he kept the launch at Monterey.

During his administration, Sola did not accomplish much toward improving the fortifications. In 1817 he had the battery at Monterey repaired with masonry, but he appears to have done nothing at Santa Barbara or San Diego. Of Yerba Buena, nothing is heard during this decade.

In November, 1818, two privateers from Buenos Ayres, the *Argentina* of thirty-eight guns and the *Santa Rosa* of twenty-eight guns, appeared off Mon-

tery. General Hyppolite Bouchard, a Frenchman who commanded the expedition, demanded the surrender of the presidio. When Sola sent back a defiant reply, the *Santa Rosa* opened fire upon the shore battery, which replied with its eight 6- and 8-pounders. The engagement lasted for about two hours, at the end of which time the *Santa Rosa* was badly battered. Bouchard then landed his troops and captured the presidio, after which he carried off or spiked the cannon and plundered the inhabitants. At the end of five days, after completing repairs to the vessels, the privateers set fire to the presidio, re-embarked, and put out to sea. In a few months the presidio and the buildings were rebuilt, and Monterey was in better condition than before the attack.

At this time in the history of California, all coast defenses were being neglected. Internal politics were absorbing all attention, and international questions were, perforce, not considered. In 1822 Mexico succeeded in becoming independent of Spain, and California became a Mexican province.

In 1824 Kotzebue, the Russian explorer, entered San Francisco Bay and found "St. Joachim on his rocky throne, truly a very peaceable and well-disposed saint; no one of his cannon in condition to fire a single shot." According to his own statement, Kotzebue had to lend the fort the powder with which it fired the salute in his honor, but the records show that a shipment of forty kegs had been received two months before the explorer arrived.

In 1826 an investigating committee reported that the fort on Point Guajarras, at San Diego, was in a deplorable state and required no less than two thousand dollars for repairs. No money was forthcoming, but in May, 1828, ten men were set to work upon the battery. The works were improved somewhat, but it was not long before the six or eight artillerymen were withdrawn from the presidio. No garrison was maintained for Point Guajarras after 1835, nor for the presidio itself after 1837.

An investigation in 1839 showed that there were two serviceable guns, out of nine, located at San Diego. In January, 1840, the remnants of the fort and casemate were sold to Juan Machado for forty dollars. The serviceable guns may have been removed; and the remainder, after having been spiked by an American captain in 1842, are said to have been thrown into the bay during the war of 1846-7.

The Russian settlement at Fort Ross grew to about three hundred persons. By 1833 the fort was somewhat out of repair. At that time this work was an enclosure, one hundred yards square. At two diagonally opposite corners, one on the seaward and one on the landward side, were octagonal blockhouses of hewn logs, with embrasures, each furnished with six 8-pounders. A large building at the main gate also had embrasures and six cannon. Three other guns were located at the quarters of the commandante. The walls and buildings were of wood and were not sufficient as a defense against artillery.

The hunting and trading for which the Russians had entered the country had much decreased, and conditions were growing worse with each passing year. In 1841 they disposed of their holdings to John A. Sutter and withdrew from California. On January 2, 1842, the Mexican flag was raised over Fort

Ross, but for want of military resources, no large or regular force was ever maintained there.

When Lieutenant Colonel Nicolas Guterrez became governor of California in 1836, the province was seething with rebellion. Guterrez came to power just in time to be instrumental in bringing about the open rupture, for an argument with Jean Bautist Alvarado, an auditor in the customs service, precipitated the trouble. The people rose in open revolt, and Guterrez called all troops who still obeyed him into the presidio of Monterey, withdrawing even those who were stationed at the fort. Alvarado quietly pushed forward in the night and occupied the abandoned works. By firing one shot at the presidio (the only round for which he could secure powder), Alvarado brought Guterrez to terms. The governor left the province, and California became "El Estado libre y soberano de la Alta California." Alvarado was appointed *gobernado interino* by the authorities in Mexico in 1838, and *gobernador propietario* in 1839, whereupon California resumed its allegiance to Mexico.

In 1839 John A. Sutter, with ten Americans and ten Hawaiians, landed near the present site of the city of Sacramento and built Sutter's Fort—a private establishment countenanced by the governor.

In 1838 the artillery in California had been reduced to about thirty pieces, well scattered. These included three iron 24-pounders, eight 8-pounders, ten 4-pounders, and one 2-pounder, some of them dismantled.

In October, 1842, Commodore Thomas Ap Catesby Jones, under the impression that the United States and Mexico were at war, entered the harbor of Monterey with the frigate *United States* and the sloop-of-war *Cyane*, landed his men, captured the fort, raised the American flag, and declared California a territory of the United States. Discovering his mistake, Jones hauled down his flag the next day, apologized to the Californian and Mexican authorities, and departed.

At San Diego, Phelps, master of the American ship *Alert*, heard of the capture of Monterey by Jones and proceeded to capture the works at Point Guijarros and spike the guns. Mofras says that at this time there were a few soldiers and an officer at the presidio and a few half-buried cannon among the ruins of the presidio and the fort at San Diego. By 1845 the fort at Monterey had about twelve men and three or four serviceable guns.

War was declared by Mexico against the United States in May, 1846; and Commodore Sloat, commanding the American Pacific squadron, was ordered to secure possession of Upper California. On the second of July, Sloat, in the *Savannah*, reached Monterey, where he found the *Cyane* and the *Levant*. On the morning of the seventh he sent Captain Mervine to demand the surrender of Monterey. The governor replied that he was not authorized to surrender the place, so Sloat landed a force of two hundred sailors and marines and took possession of the town.

On the ninth, Commander Montgomery of the *Portsmouth*, pursuant to orders from Sloat, took possession of Yerba Buena and San Francisco Bay, of

Sutter's Fort on the Sacramento, of Bodega, and of Sonoma. Lieutenant Mussroon proceeded with a detachment against Fort San Joaquin and the presidio and found them dilapidated and abandoned. Three old Spanish brass or bronze pieces, three iron 24-pounders, and four smaller iron guns, all of them spiked or useless, were lying exposed to the weather. The adobe walls were crumbled and the tile roofs had fallen in, but notwithstanding the general condition of the defenses, Mussroon hoisted the Stars and Stripes over the fort.

In January, 1847, Lieutenant Henry Wagner Hallics, of the United States Topographical Engineers, was detailed to erect fortifications at Monterey and San Francisco. At Monterey a company of one hundred and eighty men, under Lieutenant E. O. C. Ord, built a fort on the hill overlooking the anchorage and mounted therein some guns brought out by the *Lexington*. This fort was constructed of wood, the magazine being of logs dove-tailed together; and the whole was surrounded by a palisade of stakes. Fort Montgomery, at San Francisco, was a battery built on the eastern side of Telegraph Hill.

These two American works closed the construction of fortifications during the colonial period in California. Of the Mexican and Spanish works, scarce a vestige remained. Never very strong, they were now decayed beyond repair and were about to become the property of the United States. The treaty between Mexico and the United States was signed on February 2, 1848, and ratification were exchanged on May 30. California thus brought to a close its colonial existence and took up its new status as an American Territory.

III. OREGON AND WASHINGTON

The forts erected along the shores and on the navigable waters of Oregon and Washington were, for the most part, put up by fur-trading companies for their own protection. The term "fort" was applied indiscriminately to all fur-trading establishments having any pretensions to permanency, whether a bastioned fortress of stone or wood, or merely a stockade, palisade, or picketed enclosure consisting of sharpened poles or slabs.

The first attempt to establish a settlement within the geographical limits of these States was made by the Spanish in 1792, when Lieutenant Salvador Fidalgo was sent to build a fort at Port Nuñez Gaona (Neah Bay). This site was abandoned the same year before completion of the defenses.

In 1810 the Pacific Fur Company was organized in New York with John Jacob Astor at its head. In March of the following year, the first vessel of that company entered the mouth of the Columbia River to establish a trading-post. Captain Thorne determined to build the station on Point George, on the south bank of the river and about ten miles from its mouth. Bringing his vessel, the *Tonquin*, to this point, he landed his passengers and goods, and began the erection of the fort and buildings of a settlement which he named Astoria. Palisades were put up and in bastions at either end were mounted four small cannon.

The post was not destined to remain long in American possession, for in October, 1813, largely because of the war between England and the United States, the interests of the Pacific Fur Company were purchased by a British rival, the Northwest Fur Company. In December the British sloop-of-war *Raccoon* arrived to capture the American settlement, but as it had already been sold, the capture consisted solely in substituting the British flag for that of the United States and in changing the name of the establishment to Fort George.

The treaty of peace between the United States and Great Britain, signed at Ghent in December, 1814, provided for the mutual restoration of conquests; and Fort George was, in due form, delivered to Mr. J. B. Prevost in October, 1818. At that time the post consisted of a stockade made of pine logs, twelve feet in length above ground, enclosing a parallelogram of one hundred and fifty by two hundred and fifty feet, defended by bastions at two opposite angles. The ordnance consisted of two 18-pounders, six 6-pounders, four 4-pounder carronades, two 6-pounder coehorns, and seven swivel guns, all mounted.

In 1821 the Hudson Bay Company and the Northwest Fur Company were merged under the name of the former organization. In 1823 Doctor John McLoughlin, who was appointed chief factor for the Oregon region, proceeded to the Columbia River, establishing new posts and strengthening old ones. In 1825 he built Fort Vancouver, which soon became the principal depot of the Hudson Bay Company west of the Rocky Mountains. This post stood on a gentle slope, four hundred yards from the shore and about one hundred and twenty miles from the mouth of the Columbia River. The fort was simply a large, stockaded enclosure, one hundred and fifty by two hundred and fifty yards, containing houses, magazines, and workshops.

With the transfer of the fur company from Astoria to Vancouver, Fort George became a lookout and trading station of little importance. By 1834 it no longer deserved to be called a fort, and in 1841 Du Mofras described it as "a miserable squatters' place, invested by the rival American and English factions, with the pompous name of Fort George and town of Astoria, the fort being represented by a bald spot, from which the vestige of buildings had long since disappeared, and the town by a cabin and a shed." Much of the dilapidation was caused by a fire which occurred in 1820.

Two other forts were erected by the Hudson Bay Company on the coasts of Oregon and Washington. Fort Umpqua was built near the mouth of the Umpqua River, which enters the Pacific about one hundred and eighty miles south of the Columbia and affords a harbor for small vessels. Fort Nusqually was erected in 1832 at the mouth of a little river emptying into the southern end of Puget Sound.

While the dispute continued between Great Britain and the United States over the northwestern boundary, neither nation attempted to occupy the territory by force of arms. The settlement came in 1856 when a treaty between the two countries fixed upon the forty-ninth parallel as the permanent dividing line between the two countries. Thus Oregon and Washington came into the

Union, the only portion of these United States acquired by means other than combat or purchase.

IV. ALASKA

Russia, turning her eyes eastward across the vast wastes of Siberia, saw the other nations of Europe engaged in the partition of the immense continents of America. There was no apparent reason why she should not participate; her own domains, already of vast extent, were but a step from those of the New World, and her own people were accustomed to the rigorous life of the frozen north. Advancing across the steppes of Siberia, proceeding from river mouth to river mouth, a vast army of Cossack and Russian sable-hunters and explorers gradually forced their way eastward to Kamchatka and the Pacific Coast, and thence to America.

Chirikof and Bering, first of the Russians, landed on the shores of Alaska in 1741. The beautiful furs brought back by the members of the expedition aroused the desire of the traders of Kamchatka and brought about the exploration and colonization of Alaska, for furs meant to Russia what gold and jewels meant to Spain. Bassof, Nevodchikof, Tolstych, and other traders, trappers, and navigators ventured out in their frail and flimsy craft and aroused Russia to a realization of the wealth of Alaska.

Beginning with the expeditions of individual merchants, the fur trade gradually developed into a monopoly which included governmental control of the new territory. Gregor Ivanovich Shelikof, who began trading in Alaskan furs in 1776, first saw the possibilities in mergers. Effecting partnerships, he evolved the great Shelikof Company which, in 1784, established the first settlement in Alaska.

With two ships, the *Three Saints* and the *St. Simeon*, Shelikof, in August, 1784, reached a bay on the southeastern shore of Kodiak Island where, after a few days spent in exploration and in conflict with the natives, he prepared for the permanent occupation of the island. Within a few weeks the Russian carpenters and laborers had erected dwelling-houses and fortifications, whereupon the settlement received the name Three Saints. An expedition sent from this village in the spring of 1785 succeeded in establishing fortified stations on Cook Inlet and on Afognak Island.

Early in 1786 Shelikof despatched an expedition from Three Saints to erect a fort and establish a settlement at Cape St. Elias, on Kayak Island, while he busied himself nearer at home in abandoning the fort on Cook Inlet and in strengthening the fortified station on Afognak Island. Later in the year the Company established Fort Alexandrovsk near the entrance to Cook Inlet. This was a square fort, with poorly built bastions at two corners, and in it were mounted two guns.

During the same year the Lebedef-Lastochkin Company, a rival of the Shelikof Company, settled a permanent establishment at the mouth of the Kassilof River in Cook Inlet. This settlement, named Fort St. George, consisted of two log buildings protected by a stockade.

In 1788 a Russian redoubt was built at the mouth of the Copper River, a few miles south of Alaganik.

Shelikof established his colony firmly enough, but the company did not expand greatly until Alexander Andreievich Baranof was secured as its resident manager in 1790. At that time the company was in actual possession of the Kodiak Islands and a few of the smaller adjacent isles. Arriving in 1791, Baranof soon decided to remove the headquarters of the company from Three Saints Bay to Pavlovsk Harbor, on the northern side of Kodiak Island, because of the better harbor and the greater supply of timber.

In August, while Baranof was still engaged on Kodiak, another ship belonging to the Lebedef-Lastochkin Company arrived at Cook Inlet, carrying sixty-two Russians under Gregor Konovalof. Proceeding to the mouth of the Kaknu River, twenty miles beyond Fort St. George, and completely ignoring that station, the party landed and undertook the erection of habitations and fortifications, surrounded by a stockade and defended by guns. This fort they named Fort St. Nicholas. At this time the main base of operations for the Lebedef faction was at Fort St. Constantine, on Nuchek Island, consisting of the usual stockade, enclosing dwellings and storehouses. Before long, the Lebedef Company was overtaken by reverses, and these three stations were, within a few years, abandoned by that organization.

In 1792 Baranof visited Cook Inlet, where he strengthened his outlying stations and hastened the work on the fortifications.

In 1796 the Russian government caused a fort to be built on Yakutat Bay, at the mouth of Ankan Creek, for the protection of a colony of exiles assigned to this station by the Czar. Here the settlers led a miserable existence until 1805, when the colony was exterminated by the Indians.

In 1798 the Shelikof Company absorbed a number of traders and became the United American Company. Through a merger effected the following year, this became the Russian-American Fur Company, with a twenty-year monopoly of trade on the northwestern coasts of America.

The time was now ripe to expand, and Baranof immediately proceeded to Sitka Sound, where he landed about six miles north of the present site of Sitka. Purchasing a piece of ground from a Sitkan chieftan, he laid the foundations of Old Sitka in 1800, and on the shores of Sitka Bay he erected his fort which he named Fort St. Michael. This was a two-story structure protected by palisades and by two strong blockhouses or towers.

Returning to Pavlovsk later in the year, Baranof found that the Kodiak Island and Cook Inlet establishments had been broken up. At the Kaknu River station he selected a more convenient site for the fort and left the agent, Malakhof, to superintend the work. After inspecting Fort Alexandrovsk, he visited Fort St. Constantine on Nuchek Island and established that fort also upon a new site.

In May, 1802, while Baranof was absent at Afognak, a party of about six hundred natives attacked Fort St. Michael, at Sitka, drove out the garrison, and

destroyed the fort. All the officers and thirty of the men were killed. The loss of this fort was a serious blow to the Russians, and Baranof naturally yearned for revenge. Not until the spring of 1804, however, was he able to turn his attention to the reoccupation of Sitka.

In the meantime, he improved the situation of the other posts. Besides Fort St. Michael, the Company had at this time twelve stations in operation. On Kodiak Island were Forts Three Saints and Pavlovsk; on Cook Inlet were Forts St. George, St. Paul, and St. Nicholas; in the Chugatsch territory were Fort Constantine on Nuchek Island and a fort at Port Delarof; on Yakutat Bay were two forts; and there were forts on Cape St. Elias, Afognak Island, and Fort Alexandrovsk (or Alezander) on Cape Kenai, at the entrance to Cook Inlet. Most of these forts were armed with three-pounder pivot guns and were, with due precautions, strong enough to resist the attacks of hostile natives.

Arriving at Sitka in September, 1804, Baranof found that the Indians had fortified themselves on a bluff a few miles distant from the old settlement. Their fort was an irregular polygon, facing the sea, with six-foot walls, two logs in thickness. Around and above it was piled tangled brushwood, and there were two embrasures for the service of the two cannon with which it was armed. Two gates faced the forest in the rear.

On the first of October, Baranof opened fire upon the fort from his ships, but without appreciable effect upon the defenses. A landing party thereupon assaulted the works under cover of the fire from the vessels, but the natives sallied and drove the Russians to their boats. The next day the bombardment was resumed, and in the afternoon the Indians sued for peace. Several days were occupied in negotiations, and on the morning of the seventh it was discovered that the natives had evacuated the fort during the night. The Russians thereupon burned the fort to the ground and occupied the site for their new settlement Novo Arkhangelsk, New Archangel.

The construction of buildings was immediately begun, a stockade was erected around the buildings, and blockhouses were built at each corner. By June, eight substantial buildings had been erected and the fort had been completed and the cannon mounted. A few months later Baranof removed his headquarters from Kodiak to New Archangel, which thereafter remained the capital of the province. In 1810 Captain Golovnin, of the sloop-of-war *Diana*, wrote that "In the fort we could see nothing remarkable. It consisted of strong wooden bastions and palisades."

While Baranof was still at New Archangel, an expedition was sent to establish a permanent station in Bristol Bay on the Nushagak River. At the mouth of the river, the party erected a fort which they named Fort Alexandrovsk.

M. N. Mouravief arrived at New Archangel in 1821 as manager and governor, and he at once began to reorganize the garrison and to repair the fortifications of all the settlements.

Upon his arrival in 1833 as governor, Baron Ferdinand P. von Wrangell ordered Lieutenant Michael Tebenkof to proceed to Norton Sound for the

purpose of establishing a settlement. Here, on the southeast side of an island adjacent to the mainland, Tebenkof erected Michaelovski, or Fort St. Michaels, which became the principal station of the Russian-American Company in the north. The station was built on the usual plans with a picket enclosure and with flanking bastions.

In 1833 the Hudson Bay Company conceived the idea of establishing a fort on the Stikine River, and fitted out the brig *Dryad* for that purpose. Wrangell, duly informed of the project, despatched Lieutenant Dionysious Zarembo in the armed brig *Chilkah* to anticipate the British. On a small peninsula at the mouth of the Stikine, near the site of Wrangell, Zarembo erected a fortified station which he called Fort St. Dionysious and which later became Fort Wrangell. When the unsuspecting *Dryad* arrived, it was greeted by a volley from the shore as well as from the ship in the harbor. Unable to land, the British were forced to return to Fort Vancouver. The incident caused considerable trouble between the two nations, but was settled in 1840 by the payment of an indemnity and by a lease of the land to the Hudson Bay Company. Under the British, the fort became Fort Stikine.

In 1838 Malakof established a blockhouse at Nulato, on the Yukon River, but the garrison returned to Fort St. Michaels for the winter, and during the absence of the Russians, the Indians improved their opportunity by destroying the works. The site was re-occupied and a permanent post established by Lieutenant Zagoskin in 1842. Derabin assisted in the erection of this post, which took the name of Fort Derabin. The buildings of the post formed two sides of the fort and a part of a third, and the remaining parts consisted of a stockade sixteen feet high. Two watch-towers completed the fort, which was armed with a couple of antique 6-pounders.

In 1841 the Russians established a fortified post at the mouth of the Unalakleet River, on Norton Sound. Six years later, McMurray descended the Porcupine River and built Fort Yukon about a mile above the confluence of the Porcupine and the Yukon.

In 1851 the fort at Nulato was surprised by Indians, and most of the inmates were butchered. A new fort, surrounded by a stockade, was built two or three years later. In 1855 Fort Andreiefski, some distance below Nulato, was destroyed by Indians. In the same year an attack upon New Archangel, or Sitka, as it was beginning to be called, was repulsed. By this time the number of cannon in the fort at Sitka had been increased from the fifty of 1817 to about seventy.

At Fort Yukon, the encroaching waters of the strong current had gradually undermined the bank on which the fort was built, so a new fort was begun in 1864. This consisted of four blackhouses or bastions, pierced for musketry, but it was without a stockade, and was still in an unfinished condition when the United States acquired the territory.

At the expiration of the third twenty-year period of the charter to the Russian-American Company, the government and the company were unable to agree on terms for a further extension. Negotiations were thereupon opened

for the sale of the country to the United States, while the company began to make preparations to leave Alaska. Expenses were curtailed, and Nulato and some of the other stations were abandoned. It was, however, not until 1867 that the negotiations were concluded and Alaska sold to the United States for seven million two hundred thousand dollars.

Soon after the cession of Alaska to the United States, General Rosseau proceeded to Sitka to receive formal possession from the representatives of the Czar. On October 18, 1867, Captain Pestchourof ordered the Russian flag lowered; the garrisons presented arms; the guns fired a salute; and the American flag was hoisted. General Rosseau then took immediate possession of the occupied military stations.

Of the many blockhouses, forts, stockades, and fortified stations built by the Russians, there were but few left; most of them had been destroyed by the Indians or abandoned by the Russians. At the mouth of the Stikine River was Fort Wrangell, which had been kept in condition by the British for many years. At Sitka, on Baranof Island, was the strongest fort of them all, known at that time as Sitka Castle. Kodiak Island still had its station, which had become known as Kodiak. Fort Kenai, or Redoubt St. Nicholas, on the Kenai Peninsula, consisted of a high stockade with octagonal bastions at the angles and with an armament of 1½-pounder falconets. Fort St. Michaels, on Norton Sound, still cared for the Yukon trade, and up the river lay the incomplete Fort Yukon. In the military occupation which followed the cession of Alaska, these stations became part of the defenses of the only colony then possessed by the United States.

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The primary object of this type of military training is not to make soldiers, but to use some of the elements of soldiership in fitting our boys for the work of life. . . . One parent writes: "From my own personal observation of some twelve or fifteen boys who had grown up in this neighborhood, I find that the boys who have been taking military drill regularly are better physically and have that poise and mental control necessary to modern business life." Father Cullen says: "For seventeen years we have had a military organization at St. Thomas College. Its benefits to the students, both physically and mentally, are, in our experience, undoubted. Young men come to us awkward in gait, stooped in shoulders, and in-alert. In the course of one semester they acquire an agility of step, and a straightness of stature that shall constitute for them a valuable asset in whatever vocation they may enter."—Rev. Marion D. Shutter.

Activities of Anti-War Societies

By CAPT. A. W. WALDRON, C. A. C.

EVERY great nation that the world has ever known has been built on two marked characteristics of its people—national loyalty and true patriotism.

Until within the last ten or fifteen years there has always been a marked loyalty on the part of the people of the United States. Each generation as it came to take the reins of government was instilled with patriotism, and American ideals and institutions were cherished and defended.

But during the recent World War we found a growing attitude to oppose the Government, to prevent efficiency in war preparation, and to hinder its activities when our soldiers began to go overseas. This was evidenced by the endeavor to inject into the minds of the people at large certain peculiar ideas as to the reasons and causes of the conflict and to urge a settlement that would practically be a surrender on the part of the United States.

Since the close of the World War there have sprung up many anti-war or pacifist organizations having for their purpose "disarmament and universal peace."

This movement is by no means new as peace societies have existed for many years. The modern peace movement had its beginning about the year 1815. In that year three so-called Peace Societies were organized, the strongest of which, The Peace Society of London, is still in existence. From that time on, organization was rapid until 1828 when, it is recorded, there were twenty peace societies in the United States alone and the movement had extended to England, France, Ireland, and Canada.

There has been compiled by the National Council for the Prevention of War a list of eighty-seven outstanding organizations active in the Peace Movement today. These are well founded along corporation lines, installed in well equipped offices with boards of directors, salaried officers, and memberships ranging from twenty-five million (estimated as that of the Federal Council of Churches of Christ in America) to a few hundred. These societies exist by voluntary contribution, by membership fees, by endowment from such funds as the Carnegie Endowment for International Peace and the Garland Fund, and by the small fees collected for their periodical publications.

It is not the intention of this discussion to intimate that all the organizations active in the peace movement are a menace to our constituted government. Many are sincere advocates of World Peace and their endeavors are commendable. It is, however, in the radical group of professional propagandists where the real danger lies and to combat which many patriotic organizations are active. Such patriotic organizations include the Daughters of the American Revolution, The American Legion, Veterans of the World War, and the National Security League.

The subject of the activities of the anti-war societies will be taken up under four main heads, namely:

1. Professional propaganda.
2. Religion.
3. Education.
4. Politics and industry.

Professional Anti-war Propaganda.

The many anti-war societies which have sprung up in this country since the armistice vary greatly in character, composition, and size, but their dominant force in leadership rests on the individual of the professional propaganda type. Some of these organizations, and with them the individual leaders, are devoted solely and sincerely to the cause of peace among nations, while the extreme groups have aims closely paralleling those of the communist and in many cases seem to be the medium for the advancement of radical ideas.

The largest and most powerful group of this kind is the National Council for the Prevention of War, which was organized in 1921 under the name of the National Council for the Limitation of Armaments. The name was later changed to The National Council for the Reduction of Armaments and still later to its present name. It claims to have twenty-eight participating and seven cooperating organizations, representing a membership of approximately ten million men and women, and spreads its propaganda through a bulletin which has a circulation of over fifteen thousand. The Council states that it has three objectives: 1st, Progressive World Organization; 2nd, World Wide Reduction of Armaments by International Agreement; and 3rd, World Wide Education for Peace. It is a clearing house of national organizations indorsing the Limitation of Armaments whose aims are disarmament, outlawry of war, abolition of the National Guard, and Internationalism. Of their methods employed in spreading their propaganda I quote a circular letter.

During the past year we furnished speakers for 500 meetings, circulated thousands of letters on the World Court helping to take it out of the files of the Senate and make it a prime issue before the people, carried on far-reaching educational campaigns through women's organizations, churches and schools to substitute peace and good will in place of war and egotism in international relations; issued special studies on the development of the military establishment and conducted nation wide demonstrations of government action on the substitution of law for war.

At the head of this Council is a professional propagandist, who shapes its policies and puts them into effect. Their leader has indicated in his writings and speeches that his sympathies are with Soviet Russia and Communism.

This anti-war movement is well organized and works for a common objective, whereas the patriotic organizations and individuals combatting its influence work independently. Its influence on the Regular Army, Navy, and Marine Corps is apparently negligible at the present time, but in the event of war its effect might be felt in an increased number of conscientious objectors and efforts to block government action.

Anti-war Religious Societies.

Pacifism among the different religious denominations of the country find their principal means of expression through the Federal Council of Churches of Christ in America and the Church Peace Union.

The latter comprises all denominations; Protestant, Catholic, and Jewish. It has a \$2,000,000 fund donated by Andrew Carnegie, separate and distinct from the \$10,000,000 fund mentioned, and is an active force for pacifism.

The Federal Council of Churches of Christ in America was founded to give united expression to the common religious ends of the various Protestant organizations. At the present time it represents thirty religious bodies, with a membership of about twenty-five million.

The work of this council is carried on through various commissions, the principal and strongest being the Commission on International Justice and Good Will which is working to better international relations.

The view of the Federal Council in relation to war is summarized about as follows:

1. War should be outlawed.
2. Instead of war, substitute the World Court and Boards of Arbitration.
3. The World War came because Christian sentiment against it was not aroused in time to prevent it.
4. The post-war period is a period of grace of which full advantage should be taken to substitute peaceful processes for war and to eradicate from human nature the belief of the efficacy of war and of preparedness.

A study of the policies, methods, and tactics of all the religious groups of anti-war societies shows that their purposes differ very little as regards fundamentals and may be summarized about as follows:

1. To organize with foreign organizations of a like nature to develop pacifism and a belief in the uselessness and sinfulness of war.
2. To use this influence to reduce armaments and ultimately to abolish armed forces throughout the world.

The methods of these societies are all very much the same. They attack military forces from the pulpits, in daily papers, and in special publications. They preach that all war is sinful and therefore unjust and unnecessary. They appear to advocate fear and non-resistance and at the same time to appeal to the highest ideals and the basest human traits. They employ professional reformers and agitators as well as scholars and clergymen to spread their subversive and subtle propaganda.

This subversive movement for the reduction of armaments and the abolishment of all armed forces has a very sinister aspect when it is realized that such a policy coincides with the fundamentals of communism.

Radical organizations seem to find a bond of sympathy in the Churches which is hard to understand when we realize that the American Socialist Party claims that ninety-nine per cent of its members are atheists. It appears that many clergymen are affiliating with socialism in opening their pulpits and

church forums to radical agitators who are paid representatives of European revolutionary bodies. This is no doubt due to the mistaken idea of a short cut to spread the doctrine of the sinfulness of war. It certainly has the sinister aspect of sewing seeds of unrest and class distinction among a sincere, devout, and important part of our people. The only way to combat this influence is through a realization of the primary law of nature, self-preservation, and the full knowledge of the destructive results which are bound to follow from the radical teachings of pacifism.

Education.

Prior to 1914 radicalism, as represented by the anarchist and the socialist, was not a serious factor in this country. Since the World War, however, due largely to the success of communism in Russia and to the propaganda of the Third Internationale, the radical and pacifist movements have grown so that at present there are more than two hundred organizations in the country actively engaged in or in sympathy with the revolutionary and pacifist activities of the Communist Party of America, which is the strongest and most active of the radical organizations of the United States.

A large group of these radical anti-war and pacifist societies are working in our schools and colleges and maintain contact with the Executive Committee of the Communist Party of America or the Workers' Party of America, which organizations in turn interlock with the Third Internationale, the Red Trade Labor Union Internationale, and the government of the Federated Soviet Republic at Moscow.

This propaganda work of the pacifist and anti-war groups is preached and taught through such societies as the National Student Forum, the Young Peoples Socialistic League, and the so-called Youth Movement. The National Student Forum claims to be in contact with 250,000 students and has direct contact with radical clubs in dozens of institutions.

The Young People's Socialistic League, or "Yipsols," work in the public schools. This society teaches the doctrine of the Third Internationale and is affiliated with the Communist Party. It has a membership in New York City alone of several thousand, sixty per cent of whom are in the public schools and the remainder attending part time schools.

A leader of the Youth Movement recently stated at a conference of several of these radical societies that all plans had been made to spread this movement throughout the United States by means of the impressional youth in the schools. We may readily see how dangerous this is when we realize that such a movement advocates the abolishing of Christianity, government, property rights, the family, and all color lines. Communists are among the teachers in the public schools of all our large cities. Their purpose is stated by a Boston teacher, who says: "Give us one generation of small children to train to manhood and womanhood and we will set up the Bolshevist form of Soviet Government."

Pacifist propaganda as carried on through the schools aims at the destruction of our American nationalism. A careful study into the activities of these

pacifists show that since 1914 they have been pro-German, pro-peace at any cost, pro-disarmament, pro-pacifist, and finally pro-communist.

Now a final point on the educational aspect of the Educational Pacifist and one of vital importance to the country at large. This is the Anti-R. O. T. C. campaign. This movement is without a doubt a radical Communist effort, in which the Church is made a cat's-paw, by reason of its peace sentiment to abolish all military training in all of our educational institutions except West Point.

As a part of this plan and as an entering wedge there appeared the so-called Lane Pamphlet under the auspices of the Committee on Military Education which had a wide circulation through the financial backing of the Garland fund.

This pamphlet was based on the following assertions:

1. That the R. O. T. C. is a rapidly growing, sinister organization foisted by Congress on the country.
2. That it is against the ideals of peace.
3. That military training is against the development of independent thinking so necessary in our colleges.
4. That it will "militarize the country."

While stating facts regarding the R. O. T. C. that are true in themselves, it so distorts them as to lead the reader to believe that it is a bad institution.

It attacks the R. O. T. C. administration, gives the opinion of hostile educators on its value, and suggests that its graduates will constitute a formidable "Officers' Class" which will lord it over the unorganized man power of the country and will make for serious international complications. It then goes on to outline how easily the system may be broken down.

That the sponsors of this movement are well organized is evidenced by the fact that a bill was introduced in the 69th Congress for "the Abolishment of Compulsory Military Training at Schools and Colleges."

That the country at large is still fundamentally sound as regards the National Defense Act, however, is evidenced by the fact that, although this campaign was at its height during the college year 1926-27, only two colleges changed their system of R. O. T. C. training from compulsory to voluntary.

Politics and Industry.

Coming now to the political and industrial aspect of the anti-war movement we may well include under this head the Radical, or Red, element in this country and call it a Revolutionary Movement, which in effect it really is.

Radicalism, Socialism, Bolshevism, and Anarchism are among the leading questions of today. These movements are international in character and, starting in Europe, have spread not only to this country but all over the world.

The outstanding radical organization is the Communist or Third Internationale. It is the outcome of the First Internationale, which was organized in London in 1864. This was a socialist organization having for its object the organization of the workers of all countries. Bitter feuds broke out and the workers were divided more than ever. It was succeeded by the Second Internationale in 1889 and by the Third Internationale, or Communists, in 1919.

Bolshevism, Communism, and Socialism are practically the same thing, as Bolshevism and Communism are in reality only Socialism in action. The extreme group of this character are the anarchists who believe in liberty unrestricted by man-made laws. The Socialist Group is at work to destroy our present form of capitalist government and the establishment of a cooperative commonwealth. The ballot is their principal weapon. During the World War they actively opposed the government. Following our declaration of war the Socialist Party announced its policy as follows: "The Party solemnly affirms its allegiance to the principles of Internationalism and proclaims its unalterable opposition to the war just declared by the Government of the United States." It openly called on the workers of the country and its members to refuse to support the government and referred to national patriotism as a false doctrine.

Now let us see what the Socialist Party has led to. The Communist Party was organized from the so-called "left wing section" which was expelled from the Socialist Party on account of its extreme radical theories. From the Communist Party the Communist Labor Party was organized and the time was now ripe for Russia Soviet to get busy. Accordingly, the United Communist Party was formed. This is an underground, illegal organization and advocates all the principles of the Communist Internationale.

Legal parties were formed which could work in the open. They are the Worker's Party of America, the Trade Union Educational Alliance, and the Friends of Soviet Russia. All are directly controlled by the Communist Party.

The principal organizations of the industrial type are the Industrial Workers of the World and the Workers' International Union. The principal strength of the first is in the West and middle West among the miners and labor camps. They advocate direct action, stand firmly for internationalism, and recognize no country. Many different means and arguments are used to spread their propaganda. Newspapers and periodicals are printed in many different languages and agitation and speeches are used with great effect, especially among the foreigners.

The influence of these radical groups being well known and the methods pursued in the suppression of their activities having greatly lessened their activities, with the return of normal post-war conditions it is believed that they will not constitute a serious menace to our government.

SUMMARY AND CONCLUSION

It is believed that:

1. A well organized effort is being made by certain anti-war societies to break down our national system of defense.
2. That the effect of such efforts are negligible in the Regular Service but will be noticed in an increase of conscientious objectors in the next drafted army and in the placing of obstacles in the way of government action.
3. That the activities of anti-war societies sow seeds of unrest and class

distinction in what might prove to be a very fertile field, a sincere, devout and important part of our people, through religious pacifism.

4. That the affiliation of anti-war societies and Communism or Internationalists is unnatural.

5. That the most dangerous phase of radical anti-war activities is the attempt to advance the doctrines of Communism and Internationalism through the schools and colleges of the country.

6. That a coordinated and sustained effort should be made to educate our people as to the purpose of our national defense program and to break down decisively pacifist propaganda.

7. That the methods and organization of the Socialist Group being well known it is believed that they are not new, nor will be later, a menace to the organized government of the United States.

8. That in general the only real effect these anti-war societies can have on the nation at large are the causing of industrial unrest during economic crises and the undermining of the American youth through subversive teachings during their tender years.

Let us respect it as a sane man respects his insurance. There need be no fears of its excessive cost. The total budgets for national defense are far less than the budgets for many of the minor luxuries of life. We spend more for chewing gum and candy than we do for the Army and Navy together—less for national defense than for jewelry, perfume, and adornment. Our police force costs more than our national defense.—Secretary of War John W. Weeks.

History of Battery C, 65th Coast Artillery

By CAPTAIN B. L. MILBURN, C. A. C.

BATTERY C, 65th Coast Artillery is a combination Gun and Machine-Gun Battery. It was organized as a part of the 65th Coast Artillery (AA) on June 30, 1924, in accordance with G. O. No. 17, Hq. Panama Canal Department, 1924, the enlisted and commissioned personnel being transferred from the 15th Company, C. A. C., Fort Randolph, C. Z. Battery C was formerly the 2nd Company, C. A. C., organized June 1, 1917, per Mimeograph Letter, Hq. Panama C. A. District, May 21, 1917, and par. 1, G. O. No. 3, Hq. C. D. of Cristobal, 1917. On August 31, 1917, the designation was changed from 2nd Company, C. A. C., to 8th Company, Cristobal, per par. 7, G. O. No. 98, W. D., 1917, and S. O. No. 10, Hq. C. D. of Cristobal, Sept. 25, 1917. On June 30, 1922, the designation was changed from 8th Company, Cristobal, to 194th Company, C. A. C.

Battery C is now assigned to the following armament:

- Battery No. 3, four 3-inch antiaircraft guns
- Battery No. 6, three 3-inch antiaircraft guns
- Battery No. 7, three 3-inch antiaircraft guns
- Twelve .30-cal. machine guns
- Two 14-inch guns.

Of the above armament, only Battery No. 3 and the machine guns are in service.

Battery C has a record of which any organization may well be proud. Its lineage is not particularly impressive but its modern achievements are noteworthy. For the training year May 1, 1927, to April 30, 1928, the following accomplishments are of record:

a. Excelled all other antiaircraft batteries in the Canal Zone in annual machine-gun practice at aerial targets, with an average score of 244.75. This was also a higher average score than any antiaircraft machine-gun battery in the Coast Artillery. (Battery C, being a combination gun and machine-gun battery, competes against all separate gun and machine-gun batteries in the United States and foreign possessions.) Awarded the Regimental Commander's trophy for the best record in machine-gun firing (par. 3, G. O. No. 5, Hq. A. A. Def. of C. Z., 1928).

b. Excelled all other antiaircraft batteries in the Canal Zone in annual 3-inch gun practice at aerial targets, with an average score of 130.75. This was the second highest score made in gun firings in the Coast Artillery Corps. Awarded the Department Commander's trophy for the best 3-inch gun firing (G. O. No. 17, Hq. Panama Canal Department, 1928). The trophy was presented by the District Commander on June 19, 1928.

c. Awarded an "Excellent" rating by the Chief of Coast Artillery, which entitles the members of Battery C to wear the red embroidered "E" until the next training year.

d. Complimented by the Regimental Commander on the showing made by the Battery on the occasion of the District Commander's annual armament inspection, with the following remarks:

"The condition of Battery No. 3 was as good as that of any Battery I have ever seen and your machine guns could scarcely have been improved upon" (Letter April 19, 1928, File 333.1).

e. Awarded the District Commander's Cup for the best all-around battery in the Panama Coast Artillery District (G. O. No. 1, Hq. Panama Coast Artillery District, May 23, 1928). The Cup was presented by the District Commander on November 9, 1928.

f. Announced as winner of the Knox Trophy for the training year 1927-1928. The Knox Trophy is donated annually by the Society of the Sons of the Revolution in the Commonwealth of Massachusetts "to that Battery of Coast Artillery which attains the best results in target practice and gunnery." The award is made on recommendation of the Chief of Coast Artillery. The Battery Commander, was ordered to Boston, Massachusetts, to receive the trophy and attend the presentation ceremonies and banquet of the Society on January 17, 1929. In forwarding the announcement of the award to Battery C, the District Commander remarked as follows:

"The District Commander feels that the award of this trophy reflects great credit upon you, your officers, and enlisted men of Battery C. All personnel of the District, he feels sure, will join him in expressing to you congratulations on this well deserved honor. It is a result of a high degree of training, hard work and loyal cooperation of all concerned." (Letter 332, November 17, 1928.)

The following accomplishments are of record for the training year May 1, 1928, to April 30, 1929:

a. Qualified 96.8% of the personnel of the Battery in small-arms practice. This is one of the best records in the Canal Zone.

b. Excelled all other antiaircraft batteries in the Panama C. A. District in the annual machine-gun target practice at aerial targets, with an average score of 230. Awarded the Regimental Commander's trophy for second successive year for this firing (G. O. No. 6, Hq. A. A. Def. of C. Z., Sept. 1, 1928). The trophy was presented by the Regimental Commander on Sept. 18, 1928.

c. Made the highest average score (133.4) in annual antiaircraft gun practice at aerial targets. The winner of the Department Commander's trophy for this firing has not as yet been announced. Due to continued rain and inability of the Air Corps to furnish additional towing missions only two record practices out of four were held.

The accomplishments of Battery C in athletics has kept pace with its training accomplishments.

a. In the December, 1927, Department Championship Boxing bouts the battery was represented by one of the eight members of the Atlantic side team, Private Twigg. Corporal Lloyd, of the battery, also won in the Atlantic Side semi-finals but did not enter the Department finals. In the 1928 championship bouts the battery was represented by Corporal Lloyd and Private Jarvis.

b. The Harbor Defense baseball team was represented by the following members of Battery C: Corporal Lloyd, leading pitcher; Sergeant Lyons, regular shortstop, and Private Brewer, utility out fielder. The battery is represented on the 1928-1929 squad by Sergeants Lyons and Hayes and Corporal Lloyd.

c. The battery won the Post Basketball Championship in May, 1928. The Cup was presented by the Post Commander on July 17, 1928. The following members of this team were placed on the Post Squad: Sergeant Lyons, Corporals Lloyd and Snyder, Privates Leatherman and Slattery.

d. Corporal Waddell is a member of the Harbor Defense swimming team which competed in the Department meet in December, 1928.

e. The following members of the battery are on the Post Track Team which competed in the Department meet in December: Sergeant Lyons, Sergeant Simmons, Corporal Snyder, Privates Wolfred, Price, Hicks, Roush, and Ritchie. Battery C has won the last two field meets at Fort Randolph.

f. While there has never been a Post Volley Ball league, the Battery C team has always been considered the best at Fort Randolph. Battery C is the only battery from the Post which entered a Volley Ball team in the Y. M. C. A. tournament last year. Three members of the team, Sergeants Simmons and Appleman and Private Mulholland, were selected for the Atlantic Side Team for the Canal Zone Tournament.

In small-arms training, both coaches and individuals enter into a spirited competition to secure favorable scores. Every man enters record practice with the idea of doing his best for the sake of the battery. Liberal prizes are awarded for individual effort. At the conclusion of the last small-arms practice, each man who qualified received a carton of cigarettes. Cash and cigarettes for highest and second highest scores, standing, prone, etc., at various ranges and for greatest improvements over scores of the previous year were awarded.

In miscellaneous training such as First Aid, Hygiene, Guard Duty, Identification of Aircraft, etc., a special effort is made to arouse interest and make the subject attractive. In Identification of Aircraft, for example (an important phase of training for antiaircraft troops), silhouettes of airplanes of all types, classes, and countries are pasted on a large chart and differences in design and appearance pointed out. This remains in the day room for men to study and discuss during off-duty hours. Trips are made to the nearest flying field to view ships at first hand and the men are encouraged to identify and discuss the features of the planes seen in the air from time to time. During rest periods at Infantry Drill or other formations men are called upon to identify and describe

planes seen in the air. In the above manner interest is stimulated and men can readily and immediately identify planes from silhouettes, charts, or still picture slides on a movie screen.

In 3-inch gun practice the importance of the individual in the ultimate goal of "hits per gun per minute" is stressed. The fact that one man, a fuze setter for example, may ruin a practice by making a mistake, though all other details in both the range section and the gun section function perfectly, is emphasized. Most of the preliminary shooting, and during the last season, one record practice, were fired by individual guns. This provided an excellent opportunity to correct mistakes and stimulate competition between sections. A record of time and hits by sections was kept and posted on the bulletin board daily. Intense rivalry existed between the three gun sections. At first, Sergeant Kelso's section (No. 2) seemed to have the best time, Corporal Moore's (No. 3) the most hits (with relatively slow time), and Sergeant Oliver's (No. 1) most nearly approaching the ideal of "hits per gun per minute." In the end all sections approached that ideal satisfactorily.

There was similar competition in the machine-gun firing. Among the thirty men who fired the individual courses there was keen rivalry in determining the eight men to be used as gunners in the record firing. Those finally selected were Corporals Waddell and Snyder, Privates Szczepura, Wolfred, Reed, Elliott, Leatherman, and Bonzo. Two men, Privates Leatherman and Reed were lost to the section before the completion of the firing. Their places were taken by Privates McGuire and Nichols. Sergeant Simmons was Chief of Section and Second Lieutenant Donald H. Smith the Platoon Commander.

For the night machine-gun firing the men were often kept out at the firing point until late hours. When they returned to barracks sandwiches were served as a means of maintaining the excellent morale that existed during the entire firing. For some time C Battery has had a reputation of having a fine mess. To have such a mess has been recognized as a separate training objective for it is closely allied to battle efficiency.

There is much enthusiasm on the part of the Machine-Gun Platoon with reference to next year's practice. The machine-gun trophy has been won by C Battery for two consecutive years and it becomes a permanent possession of the battery if won next year. Several of the best gunners who are due to return before next year's practice have indicated a desire to have their tours of foreign service extended in order that they may help win permanent possession of the cup. This is only another indication of the fine spirit that exists in C Battery.

PROFESSIONAL NOTES

Target Practice

The gunnery problems with which we are confronted today are those which we had to meet yesterday and which will be with us tomorrow. We need more hits-per-guns-per-minute. However much we may advance in position finding, fire control, and gunnery and however much we may improve materiel and extend range, our one object will always be hitting ability.

Progress is being made, but many of us fail to appreciate fully the advance of recent years in all lines of target practice. Readers of the JOURNAL may therefore find it interesting to look back and see what was being done twenty years ago during a period of marked advance. For this reason, the following extracts from the annual reports of the Chief of Coast Artillery for 1910 and 1911 are reprinted.

ANNUAL REPORT OF CHIEF OF COAST ARTILLERY (1910)

The improvement in target practice in 1909 over 1908 with each type of heavy gun and mortar battery was marked. The same targets, except for 5-inch and 4.7-inch guns, as indicated below, were used for both years. These targets were: For heavy guns, a 30 by 60 foot hypothetical target; for rapid-fire guns, a 10 by 24 foot materiel target; for mortars, a hypothetical target having a diameter of 100 yards. (Note.—Five-inch and 4.7-inch guns used 10 by 24 foot targets in 1908 and 30 by 60 foot targets in 1909.) The ranges were—

| | 1908 | 1909 |
|---|--------------|--------------|
| Guns: | <i>Yards</i> | <i>Yards</i> |
| Primary armament | 5,000-9,000 | 4,000-10,000 |
| Intermediate and secondary armament | 1,000-6,000 | 1,500- 5,000 |
| Mortars | 3,000-9,000 | 3,000- 9,000 |

The increase in mean percentage of hits in 1909 over 1908 with each caliber of gun and mortar is as follows:

| | |
|---------------------------|------|
| 12-inch mortars | 6.4 |
| 12-inch guns | 22.2 |
| 10-inch guns | 13.5 |
| 8-inch guns | 27.6 |
| 6-inch guns | 24.2 |
| 5-inch guns | 44.6 |
| 4.7-inch guns | 43.0 |
| 4-inch guns | 18.2 |
| 3-inch guns | 10.5 |

As will be seen from the above, the mean percentage of hits for 1909 with all guns and mortars show consistent improvement over the previous year. The following individual records made with guns and mortars in 1909 are especially noteworthy:

Mortars—At Fort Howard, Md., in August, 1909, the Twenty-first and One hundred and third companies, Coast Artillery Corps, manning a battery of 12-inch mortars, made 8 hits out of 14 shots in seven minutes and thirty seconds. In this practice 1.07 hits per minute were made, which is the highest rate of hitting that has yet been attained by a mortar battery. In the best mortar practice for 1908, 0.881 hits per minute were made. This improvement not only in best records, but the consistent improvement with our mortars, is very gratifying. These records are made by firing one mortar at a time. As stated in my last report, it is contemplated to fire mortars in service in groups of 4 or 8, so that the hits per minute which are now being made in practice should be greatly multiplied. The

accuracy of mortars at long range, and their moral effect on an enemy, will undoubtedly deter the most zealous enemy from approaching our fortifications except in case of direst necessity.

Heavy guns.—The most remarkable score which has yet been made by heavy guns was made by the Eighteenth Company, Coast Artillery Corps, at Fort Hancock, N. J., in September, 1909. This company, manning 10-inch rifles on disappearing carriages, fired four shots at a moving material target 30 feet high by 60 feet long at a range of almost 7000 yards, or 4 miles from the battery. All four shots struck the material target, actually passing through a rectangle 24 feet high by 53 feet long. The four shots were fired in a total elapsed time of less than one minute, the battery scoring slightly over two hits per gun per minute.

Another exceptionally good record with 10-inch rifles on disappearing carriages was made by the One hundred and fifteenth Company, Coast Artillery Corps, at Fort Rosecrans, Cal., in October, 1909. Four shots were fired at a moving target 30 feet high by 60 feet long at a range of about 9000 yards, or 5 miles from the battery. Three of the four shots scored hits, all four shots passing through a rectangle 9 feet high by 45 feet wide. One of the shots passed 4 yards to the left of the target. The four shots were fired in a total elapsed time of one minute and twenty seconds, the battery scoring 1.13 hits per gun per minute. Each shot splashed water over the target.

In accordance with the plan referred to in my last annual report, night firing was held in 1909 by six companies of the Coast Artillery Corps assigned to rapid-fire guns. The firing was held in six harbors where the shipping at night was so little as to permit the firing to be held with safety. The results of this first attempt at night firing was very satisfactory. The scores, except in one case, were low, but the feasibility of such firing was demonstrated. One company made 75 per cent of hits, and although the rate of firing was slow the record is considered exceptionally good for night work. The Ordnance Department is now taking steps to secure satisfactory shell tracers, and as soon as these are provided night practice will be continued in all harbors where it can be held safely. It is hoped to extend this firing to include, eventually, all heavy caliber guns.

As stated in my last annual report, rules and regulations governing target practice are now drawn with a view to making the study of gunnery and target practice progressive. In 1909 all companies assigned to 8-inch, 10-inch, and 12-inch guns, with four exceptions, qualified at short range for advancement to long range, so that practically all heavy gun batteries are having practice this year at long range. The fact that practically *all* heavy gun batteries have qualified at short range shows that our personnel assigned to these guns can now hit at short ranges. It is the plan to advance to long ranges and fire there until our companies can, on the average, do satisfactory work at these ranges. In accordance with this policy of making the study of gunnery and target practice progressive, therefore, it is hoped that in the near future fire and battle command practice will be held at short and long ranges under war conditions as nearly as it is possible to simulate them.

The improvement in target practice with the guns and mortars in the last few years has been consistent, showing a steady advance toward a maximum of efficiency in target practice. As the target practice improves, the requirements as to conditions affecting practice are made more difficult. For example, this year (1910), for the first time, practically all practice with heavy guns (8-inch, 10-inch, and 12-inch) is beyond 7000 yards, or 4 miles, and only actual hits made on a 30 by 60 foot screen are counted. Heretofore, ranges have been shorter and hits have been counted on a *hypothetical target*. It is to be expected, then, that improvement in practice as evidenced by mean percentage of hits may not be as marked in the future as it has been in the past. Knowledge of gunnery and ability to hit is, however, advancing steadily, and the interest and enthusiasm of officers and men in target practice encourages a healthy spirit in the Coast Artillery Corps.

ANNUAL REPORT OF CHIEF OF COAST ARTILLERY (1911)

Target practice for the year 1910 was very satisfactory. No accurate comparison of the percentage of hits with heavy guns can be made with the year 1909, because in that year a hypothetical target was used while in 1910 a material target was used. The ranges for 1910 were greater than those fired at in 1909. Practically all of the practices with the heavy guns for 1910 were held between 7,000 and 10,000 yards, the mean range being about 8000 yards. A few practices were held with 10-inch and 12-inch guns at ranges greater than 10,000 yards. The mean ranges for 1909 were from about 5000 to 6000 yards. In 1909 half the practices were held at short range (4000 yards to 5000 yards), while the other half were held at long range (minimum of 7000 yards). The percentages of hits in 1910 were greater than the probability of hitting at the ranges at which the firing was held. Although a relatively small percentage of hits was scored on the small 30 by 60 foot material target at extreme ranges, the accuracy of the practices was remarkably good, and had battleship targets been fired at practically every shot would have hit, as there was little or no wild shooting. Ranges are increasing every year, and it is hoped next year to have all practices with heavy guns at extreme ranges, at least up to 12,000 yards.

The mortars showed continued improvement over last year, and two records of 9 hits out of 10 shots were made on a moving target. In one of these practices 10 shots were fired in 9 minutes 53 seconds; in the other the time for 10 shots was 10 minutes.

Excellent work was done with the heavy guns at Manila in night firing. These guns fired at long ranges, and one case of night firing is reported during 1910 in which 3 hits were made out of 4 shots at about 5000 yards range with 12-inch rifles. A recent report of night firing with 12-inch guns at Fort Mills, Corregidor Island, has been received, which shows that 4 hits were made out of 6 shots on a material target with 30 by 60 foot screen, which was moving at the rate of $8\frac{1}{2}$ miles per hour at a range of about $4\frac{1}{4}$ miles from the battery firing.

Battery G 241st Artillery, C. A. (H. D.) Mass. National Guard

REGIMENTAL INSIGNIA

241ST COAST ARTILLERY (HARBOR DEFENSE)

The Regiment was known as the "Roxbury Artillery" in the Revolutionary War. On the insignia it is represented by the arm and saber on a field of artillery red.

It was called the "First Massachusetts Volunteer Infantry" in the Civil War, and is represented by the white diamond on the blue background.

In the World War the Regiment was known as the "55th Artillery, C. A. C." It is represented on the insignia by the falcon on the mount (Montfaucon) on a red background.

The Regimental motto, *Vigilantia*, means watchfulness, being alert.

HISTORICAL SKETCH

Due to a wave of pacifism at the close of the Revolutionary War, the entire Continental Army was disbanded by Congress in 1783. Battery F, 3rd Field Artillery, which was guarding stores at West Point, and commanded by Alexander Hamilton was overlooked.

On May 11, 1787, Governor Bowdoin submitted to his council the petition of Thomas Adams and fifty-three others that gave Battery G, then known as the "Boston Fusiliers," its original charter at Bunker Hill, July 4th, 1787. The Company held its first parade in the morning and was invited to dinner by John Hancock.

Colonel William Turner, the first commander, his officers and the men of the Company had, with few exceptions, fought in the Revolution. The Boston Fusiliers, armed with the fusil piece, was an Infantry unit, and the first to be organized in the United States. Its members represented the best families of Boston. The uniform adopted was that of the British; a brilliant red coat, blue trousers, and shako headpiece.

It did parade and escort duty for the reception to General George Washington in October, 1787, and at the funeral of Governor Hancock, October, 1793. It participated in the ceremonies of laying the corner-stone of the State House in the Hancock pasture, July 4, 1795, being the sole escort to Governor Samuel Adams. Later, in June, 1825, the Company was present at General Lafayette's reception at the laying of the corner-stone of Bunker Hill monument.

The Boston Fusilier Company served in many civil and military events from Shay's insurrection to the World War in 1918, including the War of 1812, Mexican War, Civil War (furnishing 150 officers and 450 enlisted men, taking part in 14 battles), and the Spanish War. During the World War it was known as Battery F, 55th Artillery, Coast Artillery Corps, and engaged in the following battles: Arcis le Ponsart, Second Marne, Argonne, Montfaucon, Gesnes, and Beaufort. It is replete with tradition, and has given to the Army four generals, seven colonels, and many men who have brought conspicuous honor upon the Company.

In its one hundred and forty-one years' existence there have been twenty-nine commanders. Originally known as the "Fusiliers," later the "Hancock Light Infantry," and today, firing 12-inch breech-loading mortars, it is known as "Battery G, 241st Coast Artillery (Harbor Defense)."

A New Administration and a New War

Mr. Hoover had just stepped over the White House threshold when events compelled him to recognize that he had a war on his hands. The troops on the border probably will prevent it from drifting actually into American territory, but if a part of the American army were not in Texas it certainly would do so. For one thing, the discrimination against the rebels would lead to retaliation on Texas towns. Villa did that for just such a reason.

The sounds of the pacifist lobbies in Washington had hardly died down with the adjournment of congress when this happened. These lobbies were hopefully observing the inauguration and preparing for a renewal of their work under a new administration when a President not twenty-four hours in office was dealing with questions of war and was making the United States an intervening force in the war to serve necessary purposes of its own. It couldn't be avoided. The questions were there and they involved the United States.

It was the same old thing. Experience had prepared for it. The event forced it. It made foolishness of the illusions and the wishful thinking. It will not have any impressiveness or meaning for the pacifists and clerics, but the first fact of the Hoover administration was a war. It may turn out not to be a big one, and if the United States is lucky it may not have a great deal more to do with it, but there it is.—*Chicago Daily Tribune*.

Those Who Know War Want Peace

It is significant that the American Legion and other bodies of men who have been in war and know from experience the horrors it brings in its wake, take the rational attitude that the best way to preserve peace is to maintain proper defensive forces. Americans who entered the World War, whether they took part in battle or did not get beyond the concentration camps, know the awful penalties of unpreparedness. They know that if this country had prepared for what was plainly possible from the beginning of the European conflict and ultimately proved inevitable, there would have been tremendous saving of life and suffering and treasure. They know that a great, rich country, inadequately guarded, invites war, while such a country, with adequate defenses, is in a position to discourage aggression and, failing to prevent it, to protect itself and keep its losses to the minimum. It is an anomaly that those who preach unpreparedness as a way to peace are mostly those who have had no personal contact with war.—*Kansas City Times*.

Radio and Aviation

By C. J. PANNILL,

Vice President and General Manager, Radiomarine Corporation of America

A new day is dawning in aviation. Out of the welter of experimentation and spectacular stunt flying, there is emerging a concrete and practical ideal which is steadily gaining momentum—that ideal is feasible commercial aviation. If, however, the airplane is to be utilized for the practical transportation of passengers and cargoes, it is necessary to consider the ways and means of nullifying or eliminating, as far as possible, the risks attendant upon flying.

Without question, the most important measure of safety is a satisfactory and reliable signaling system. It is a matter of record that the railroads would never have become the highly efficient transportation agency that it is today, without the elaborate signaling systems which they have developed. With aviation, it must be much the same story if this latest means of transportation is to live up to the golden promises which it now holds forth.

The aviator must know weather conditions in advance, so that he may avoid dangerous flying conditions. He must keep in constant touch with flying fields along his route. He is often compelled to wing his way through impenetrable fogs and darkness, dependent solely upon radio beacons for some knowledge of his position. He must frequently replenish his supply of fuel and oil. Finally, it may not be so much a question of reassuring the aviator, for he knows the risks of flying; but that of gaining public confidence and support, if commercial flying is to succeed, and this depends mainly on proved safety.

To the public, safety and radio are almost synonymous. That radio must be included in the equipment of the commercial aircraft of the future is a foregone conclusion. Realizing this, our flying fields, our communications organizations, our private enterprises interested in the promotion of aviation, and our Government are beginning to take steps to insure the safety of air transportation. On every hand ground facilities necessary to maintain contact with aircraft are being provided. In particular, the Government has inaugurated an elaborate system of radio beacons along our main airways, as well as arranged for supplying weather reports and other pertinent information to airmen via radio telephone stations. However, all these ground preparations are as nothing if proper radio equipment is not carried by airplanes and airships.

The design and manufacture of aircraft radio is a distinct problem of its own, apart from other types of radio equipment. Obviously, the stringent limitations of weight and space must enter into the calculations, while care must be taken to insure simplicity of operation together with maximum efficiency.

Engineering staffs have applied themselves to the task of developing suitable aircraft radio equipment that could be standardized for meeting the requirements of a wide variety of airplanes.

As a result, transmitting and receiving equipment for installation on practically any type of airplane has been produced, rated at 100 watts, with a radio telephone transmitting range of about 150 to 200 miles, and a radio telegraph (CW) transmitting range of from 500 to 800 in daylight. The total weight, including wind-driven generator, is 86 pounds. This equipment may be had with a dynamotor energized from the same 12-volt storage battery which controls the starter and the lights of the plane.

The receiving set, which, of course, requires careful adjustment in tuning in a wide range of signals, is mounted conveniently near the operator. The aircraft transmitters have been designed to operate on any fixed frequency in the wave band set aside for aircraft communication. This band is between 2250 and 2750 kilocycles, which is the approximate equivalent of 133 to 109 meters. It is interesting to note that the wave length may be adjusted while the plane is on the ground, preferably, by means of the test box, so as to have the greatest efficiency of adjustments.

In both transmitting and receiving units, the utmost care has been exercised to protect the vacuum tubes from the shocks incidental to rough and stormy flights and forced landings.

As a valuable aid to air navigation a special beacon receiver has just been brought out to operate in the wave-length range of from 580 to 1100 meters. With this receiver, which may also be used for other radio communication purposes, the pilot can determine the course he is flying by means of the characteristic signals sent out by beacon beam transmitter stations. The Department of Commerce is rapidly installing these beacon beam radio stations at the principal airports for the particular use of the airmail planes. The beacon receiver may be conveniently placed anywhere in the plane within thirty feet of the operator. A single dial on the dashboard is all that is necessary for remote control operation.

The aircraft radio antenna is simply a trailing wire provided with a stream-lined weight. This wire, which may be anywhere from 80 to 130 feet in length, is controlled by an antenna reel that feeds it through an insulated bushing or fairlead in the floor of the cockpit or cabin.

Needless to say, the power source presents a delicate problem in the aircraft radio installation. In the new aircraft radio equipment, however, all the necessary power may be had from either a wind-driven generator, or a dynamotor installed in the cockpit. The generator is provided with an air propeller which automatically maintains the correct normal speed just so long as the plane stays in the air. If, however, maximum speed is desired from the airplane, the generator may be arranged with a retractible mount, so that it may be drawn into the cabin when not in use. The dynamotor operates from a 12-volt storage battery which may be the same one that furnishes the power for starting and for the lights.

The usual radio installation serves the purpose of an inter-communicating system between pilot and radio operator or passenger, in addition to radio communication. In fact, by means of a switch on the control panel, the pilot and the radio operator or passenger can speak back and forth, since both may be provided with helmets containing headphones, as well as microphones carried by chest straps. If the pilot or radio operator wishes to telephone to ground or to another plane, the control switch is flipped to the radio telephone position. It is also a simple matter to arrange for radio telegraph communication with other planes or the ground.

The Military Significance of the Recoil Principle.

The Rocket Problem

By ROBERT W. E. LADEMAN

Extract from the *Militär-Wochenblatt*, translated by Colonel George Ruhlen, U. S. A., Ret.

The rocket automobile trials of Opel and others of the past year resulted only in confirming the views of the American university professor Robert H. Goddard, but they have directed the attention of larger circles to the application of the recoil principle and have, it is hoped, brought that subject into the foreground in our country also. There were employed with the Opel vehicles rocket explosive material that, it is to be regretted, manifested, aside from other defects, unsuitable nozzles. The loose arrangement of these five-kilogram gunpowder rockets contributed much to the catastrophe predicted by me.

[The author here enters upon a history of the powder-propelled rocket from its earliest discovery and use in war and for other purposes to about 1866 and 1870 when its use as a fighting war weapon was practically discontinued and its retention for military purposes restricted to signalling and illumination. He then proceeds with that which follows.]

The proposition to propel the rocket with higher and more rapidly acting explosives than the ordinary gun powder has been confronted with many and almost insuperable difficulties on account of the short explosive action and the immense pressure exerted on the container and its destructive effect on the material used in its manufacture.

This brings us to the consideration of the use of fluid explosives, petroleum, gasoline, etc., as the driving force of the rocket as of far greater advantage than solid substances like gunpowder; aside from their ten times greater heating property and rapidity of exhaust action they permit refilling without any material difficulty; the fluid propelled recoil action (or, in short—recoiler) is, together with a greater development of power, lighter, safer, and more long lived than the high-explosive rocket.

The recoiler is, in fact, one of the most fundamental and most simple of non-elementary machines. Its most important part is the burning chamber or "oven" which, by intervention of a gradually diverging tube terminates in a nozzle. Burning and propelling materials are fed with pumps as is done with a gas-burning motor or they are pushed into the oven by appropriate utilization of chemical action over the dispersing nozzles where ignition takes place. The gas-forming results of the ignition acts with great rapidity through the door of the oven into the neck of the nozzle and further on with an exhaust velocity of from 3 to 5 kilometers per second according to the material selected for ignition. It is worthy of remark that aside from the action of the pumps there is no other rotary or vibratory action movement of any solid mass.

The development of these recoilers has proceeded almost without any connection with powder rockets or rockets generally. Aside from a number of well known applications of direct recoil of emerging water columns the history of fluid or gas-driven recoilers is wholly unknown. Recoil action was known to the ancients as the Aeropyle of Hero of Alexandria; today we see the same apparatus as a device for sprinkling lawns with the principle of the Segner water wheel. Newton developed a small wagon propelled by recoil action of emerging water vapor.

Recoil promoters were silent for nearly 200 years after Newton. About 30 years ago the Peruvian engineer Paulet tried a small fluid recoiler; he used gasoline and nitro-dioxide. The recently invented vanadium steel served as the material for the container.

But the Russian scientist Ziolkowsky made a nearer approach to application of the direct recoil in his attempts to reach heavenly bodies. It is due to his extraordinary efforts and studies that measures are being inaugurated by the Central Institute of Aerodynamics at Moscow to build registering rockets to reach a summit elevation of 200 kilometers or more.

A second prominent advance worker in this field is professor Goddard, a resident of the United States. He has devised a highly valuable recoiler for registering rockets for meteorological purposes by his theoretical and practical studies. According to the annual report for 1927 of the National Advisory Committee for Aeronautics systematic plans for further experiments are being carried on at Langley Field.

The recoilers permit for their use as motive power gas and explosive torpedoes—which later failed to work in experiments made by the Krupps in 1901-07 with the powder aerial rockets invented by Unge. Steering and safe laying is done automatically by means of short wave direction which we have learned by ample experience. The tip of the drop form aerial torpedo is provided with a contact fuze which does not however preclude the application of a time fuze also. Thanks to the great height of the trajectory—from 40 to 100 kilometers or more—these torpedoes, charged with explosive chambers or poison gas containers, are inaudible; in consequence of their restricted size and the absence of any appearance of flash at the carefully adjusted nozzles they are also invisible. Their velocity is, at less than 30 kilometers elevation, 2 kilometers per second and greater at the vertex of their trajectory and for that reason they are practically immune from being hit by antiaircraft fire. The flying torpedo is *invisible, invulnerable, and inaudible*. Its range is, as has been shown by my computations, beyond any ordinary calculated land distance. The penetrating power is an elementary force; even though the descent of the winged air torpedo is, to a certain extent, retarded or braked by the increasing density of the atmos-

phere and other artificial expedients; the destructive heating of the exterior surface like that to which meteors are subjected is absent.

The recoil-driven flying torpedo can be worked out and developed as a flying bomber and further as an artillery projectile. A bombing flying craft can cover a comparatively small area only with expenditure of expensive material and a large service personnel and many hours are required for preparation and its approach during all of which it is subjected to enemy attack and pursuit. And finally, assurance of hitting a definite target from a height of from four to five kilometers is questionable. The principle advantage of the artillery weapon lies in the practicability of enclosing the enemy in a definite zone cover and concentrating a destructive fire on him at any point at the same time.

The aerial torpedo has many advantages in comparison. It cannot be deemed that a runway 50 meters in length could not be arranged at any place in the rearward areas more cheaply, more securely than is required for a large airplane airport. No valuable human lives are exposed in the unmanned flying torpedo and there need be but little solicitude about systematic observation of meteorological weather conditions on the field of operations and the surrounding territory. I see the principal value of the aerial torpedo in the actual shortening of the fighting action, not only from material but also from moral grounds. The mental impression of feasible long-distance fighting action upon troops and population beyond one's own front will far exceed that of former years. Distance no longer plays a role and electric waves can reach anywhere. The recoiler can be used equally in the defensive. The flying torpedo is in fact only an arbitrarily selected example of the military utilization of recoil action; one can of course use it against all kinds of targets with promise of a fair degree of accuracy: not only against fortifications, troop assembly places, industrial centers, ports, and larger battle ships but as minor torpedoes against slow-flying all-metal airships. It will be an excellent carrier of large quantities of poison gas and poison screening vapor in naval warfare.

A further use of the flying torpedo not heretofore mentioned is replacement or substitution by torpedoes of the heavy armored fighting artillery. The aerial torpedoes far exceed ballistic projectiles in range and power of penetration and there is only a question whether or not the dispersion is greater than that of the artillery projectile. Experience heretofore acquired with projectiles with rocket propulsion have disclosed great dispersion. The super-artillery of tomorrow provided with technical impact adjustments, the surface wing plane for example, whose form is dependent upon conditions of velocity of sound, will call for larger mass for the purpose of acquiring greater living force; for that reason there will be available place and weight-carrying capacity for the 10 to 15-kilogram weight of self steering appliance. The torpedoes will become lighter for use on the water and will have to rise only a few meters over the water surface; the heavy armored containers will disappear. Their place will be taken by not more than 2 or 4 moveable starters like those of a catapult or minenwerfer. The total weight of an equipment, even with an equal number of aerial torpedoes will be less than that of the armament of major fighting units. The endurance of the runway appliances is incomparably greater than that of the barrels of high-caliber guns. The expenses are less. Finally, the principal value of the recoil-driven aerial torpedo is not that it will displace heavy artillery but rather in its greater possibility of achievement in that field. It is materially and morally more effective and above all less expensive to send a number of dozens of aerial torpedoes against the enemy than an entire bombing or pursuit squadron or to develop a valuable war navy and short-lived long-range guns, and to subject all that fighting material together with its irreplaceable service personnel to enemy fight action. The deciding battle of the future will be carried on not only from vessel to vessel, from trench to trench but from port to port and still further land to land.

Chinese Moon-Feast and Mid Autumn Festival

By H. G. O. HALLOCK

The Chinese 15th of the 8th month is called "Tsoong Tsiu"—Middle Autumn. On that day they have theatricals before all the gods in the temple and burn the "Shaung-teo"—incense bushel. This bushel-like measure is made of incense sticks. The largest "bushels" sometimes measure as much as 20 feet in diameter. In the middle of the "bushel" is a long, large stick of incense made up of thousands of thin incense sticks the size of vermicelli. On the afternoon and night of this day each family also burns an incense bushel at home. These are smaller than the ones burned in the temple. On this day they who can so afford eat moon-cakes and all kinds of nice things. The incense bushel is decorated with flags and many-colored dragon-gates something as children at home put candles on their birthday cakes; but the children in China take the flags and dragon-gate decorations from the bushel before it is burnt, and have great delight in playing with these, marching up and down the streets.

I asked the Chinese why they burn the incense bushel and eat the moon-cake, and worship the moon with candles, incense and food on this day. They answered that there are many reasons for it and many stories are told about it. One of the reasons is because there is a lady-god in the moon. Her name is Zaung-noo. She is said to be exceedingly beautiful as she. She was once upon a time a woman of this world but became displeased with her husband and all the world and fled to the moon. On this 15th the real story of why she fled is acted out in the long theatrical plays attended by throngs of people. In ancient times on the 15th of the 8th month when they burned the incense bushel the sweet fragrance would go high up to the moon goddess. She took pleasure in it and manifested her approval by coming near earth riding on a cloud and people could see her beautiful face. But now men's hearts have become wicked, and the world is full of sin, so the incense is not so pure as formerly and it does not rise so high as to reach the goddess in her palace and so, not enjoying its fragrance, she comes no more on the clouds; but people still offer incense and hope she will appear sometime.

They say that in the moon this goddess has a most beautiful castle. It is called the "Yuih-Koong"—Moon Palace. Only one human has ever seen its glories. Once, during the Dong Dynasty, a Chinese king, called Ming Wong, by the Magic of a holy monk, was enabled to mount up from the earth to the Moon Castle to hear the music and see its beauty. He was allowed to stand outside for only a very few minutes. By that time the goddess knew that the king of man was there. She was very angry at the monk for leading the king to her holy land. Soon from the Castle came most unpleasant sounds. The monk understood that it was the queen's giving vent to her wrath and he quickly led the king back to earth.

Echo Sounding Gear

Since its inception just over two years ago, the new method of echo sounding at sea to replace the lead and wire has made rapid and remarkable progress. The lecture on the subject given at the Royal Geographical Society by the Hydrographer of the Navy shows that once again the fighting sailor has made a step forward in scientific progress, of which not only himself but sea-farers generally get the benefit. Echo sounding was mentioned at the International Conference of Hydrographers in 1919, but was then not far enough advanced. It was known that foreign countries, especially the United States and France, were at work upon it, and, as nothing was published in this country, the impression got abroad that we were behindhand. The reverse is the case. The first practical application was made by the British Admiralty. All our surveying ships were fitted, and the experience gained in them is being utilized in extending the invention to fighting and merchant vessels.

A report from the navigating officer of the *Australia* after he had come safely through 12-hour and 25-hour fogs in the St. Lawrence and off Nova Scotia spoke with enthusiasm of the apparatus, and of a feeling of confidence which he had never known before. In his run from Halifax he "got an unexpected set of seven miles and bowled it out entirely by soundings." In time every well-found ship will be fitted for the new method, and with it, and directional wireless, the lot of the captain and navigator in thick weather and when approaching land will be a far happier one.—*The Army, Navy and Air Force Gazette*, Mar. 14, 1929.

New Submarines

After a delay of nearly twelve months, due to the withholding of credits for them, orders have at last been given for the five contract-built submarines in the 1928 programme. The three firms which have taken up this work under the post-war regime, Vickers-Armstrongs, Cammell Laird, and Beardmore, share the contracts between them. It will not be until 1931 that these vessels will come into service, and the delay in proceeding with the submarine replacement programme is likely to produce an unfortunate situation in the meantime. The official life of a submarine is reckoned at twelve years. Orders have already been given for the scrapping of the last of the vessels completed in 1917 ("L" 1, "L" 2 and "L" 7), and even for the first of those completed during 1918 ("L" 8). There were 16 other submarines completed during 1918, and if these pass off the list at their appointed time, followed by the 15 completed during 1919, the total of submarines will have been reduced by the end of 1931 from the 52 at which it now stands to 20. Towards making up this wastage, 18 new vessels, in three groups of six each, will have been completed, so that the actual total will be only 38 vessels. For an establishment of 60 submarines, new construction ought to proceed at an average rate of five a year, but it must be remembered that only four were laid down in the nine years between 1918 and 1927.—*The Army, Navy and Air Force Gazette*, Mar. 14, 1929.

Foreign Periodicals

Rivista Marittima, January, 1929

- CHARACTER IN MILITARY CHIEFS. By Commander G. Pfatisch.
 APPLICATIONS OF OPTICS TO NAVAL WARFARE. By Commander A. Iachino.
 THE WATCH OF ENEMY COASTS BY THE SUBMARINE. By Commander G. Maraghini.
 RADIO IN CONNECTION WITH THE SAFEGUARDING OF HUMAN LIFE AT SEA. By Commander G. Montefinale.
 ON THE HYDROPHONE PROBLEM. By Naval Lieutenant R. Palladino.

Rivista Militaire Italiana, January, 1929

- LUIGI CADORNA.
 "MACALLE." By Lt. Col. Reisolis.
 ALPINE WARFARE. By General Ottavio Zoppi.
 THE STRATEGIST AND THE GUN. By Colonel Caracciolo.
 A PROBLEM INVOLVING THE EMPLOYMENT OF THE CLOSE RECONNAISSANCE GROUP OF THE DIVISION. By Lieut. Col. Zanotti.
 QUESTIONS OF MARITIME LOGISTICS. By Commander Tioravanzo.

L' Universo, January, 1929

- UPON THE "SPUR OF ITALY" (The Gargano Promontory). By Cosimo Bertacchi.
 IMPRESSIONS OF THE INTERNATIONAL CONGRESS OF MATHEMATICS. By Antonio Loperfido.
 GIUSEPPE SERGI'S NEW BOOK: THE AMERICAN NATIVES. By Ludovico Di Caporiacco.

Rivista di Artiglieria e Genio, January, 1929

THE ENGINEER BRANCH IN FORCES CAPABLE OF RAPID MOVEMENT. By Colonel E. Cianetti.

THE LARGE STORAGE OF POISON SUBSTANCES AND METEOROLOGY. By Domenico Salvaggi.

THE CALCULATION AND CONSTRUCTION OF RETAINING DAMS IN ACCORDANCE WITH THE RECENT ENACTMENTS ON THE SUBJECT. By Q. D'A.

STUDY ON THE THEORY OF THE MUZZLE BRAKE (Continuation and end). Lieutenant Ermanno Ravelli.

THE INTERNATIONAL FEDERATION OF THE TECHNICAL PRESS AND ITS 4TH CONGRESS. By Lieut. Col. Alberto Stabarin.

WITH THE TELEGRAPH OPERATORS OF THE CARSO. By General Giovanni Grisolia.

Rivista Aeronautica, January, 1929

A FLIGHT OVER MIJERTHAIN (Italian Somaliland).

AVIATION PRIOR TO THE WORLD WAR. By General Rodolfo Verduzio.

THE TRAFFIC AIRWAYS OF THE WORLD. By Lieut. Col. G. M. Beltrami.

THE FIRE OF COMPLETE AIR UNITS. INDIVIDUALLY AIMED OR SIMULTANEOUS FIRE? By A. Ginocchirrti.

THE VELOCITY AND DIRECTION OF AIR CURRENTS IN THE FORENOON AND THE AFTERNOON. By Professor Filippo Eredia.

THE MUSCULAR SENSE IN RELATION TO THE APTITUDE FOR FLYING. By 2nd Lieutenant A. Faenzi.

THE FIAT A-50 (85-90 H. P.).

ELEKTRON, THE LIGHT ALLOYS AND THEIR AERONAUTICAL APPLICATIONS. By R. Ranelli.

EUROPEAN AIR POLITICS. By Lieut. Col. G. M. Beltrami.

MILITARY AERONAUTICS: Ideas for a new German Regulation on Field Fortifications; The French Military Aviation Material; The Teachings of the Moroccan War (1925-1926) as respects Aviation; Need of a National Defense Secretary by the U. S.

AEROTECHNICS: The Fokker Trimotor 10; The Touring and School Airplane "Breda 15" with single 85 H. P. Engine; The Touring Machine "Cant 26"; The Light Airplane "Imp"; The Two-seater School Sailplane "Mecklenburg"; The Pursuit Airplane Engine "Asso 450"; The Function of the Automatic Slot; Flying with the Instruments; Flying in the Fog; The Danger of Lightning in Flight; Modes of Prevention of Corrosion of Aviation Instruments; The New Fuel Gas Used in the "Count Zeppelin"; A New Headlight for Planes; The American Russel Lobe Parachute.

CIVIL AERONAUTICS: Speed Record; World Records; de Pinedo Cup; The Airways, the Organization and the Points of Support of a Transatlantic Air Traffic; The Automobile Association and Aviation; Aerial and Surface Transports; Has Aviation a Future?

By throwing down our arms and practically disbanding our Army and Navy, we at the same time are rendering ourselves defenseless, not only against aggression from other less idealistic nations, but also against revolution from within.—Assistant Secretary of War, Dwight F. Davis.

COAST ARTILLERY BOARD NOTES

Communications relating to the development or improvement in methods or materiel for the Coast Artillery will be welcome from any member of the Corps or of the service at large. These communications, with models or drawings of devices proposed, may be sent direct to the Coast Artillery Board, Fort Monroe, Virginia, and will receive careful consideration. W. E. COLX, Colonel, Coast Artillery Corps, President, Coast Artillery Board.

Project No. 694, Test of Erosion Charts.—The Coast Artillery Board is in receipt of charts showing loss in velocity due to erosion. The following test on the erosion curve for the 10-inch gun is proposed:

- a. Star gauge the 10-inch guns of *Battery Church* or *Eustis*.
- b. Obtain the muzzle velocity of these guns with a Jekaduma chronograph. This will require not less than five velocity rounds with each gun.
- c. The above will be done after the Jekaduma chronograph is received at Fort Monroe, and prior to the commencement of the season's firings.
- d. Insofar as practicable, all 10-inch firings at this fort during the coming spring and summer should be fired from either *Battery Church* or *Battery Eustis*.
- e. At the end of the last target practice this summer, star gauge the guns and take muzzle velocities as before, all velocity rounds being fired with the same lot of powder.
- f. The change in measured muzzle velocity corresponding to the erosion as determined by the star gauging can then be compared with change in muzzle velocity as determined by the erosion curve.

Project No. 695, Confidential.

Project No. 696, Antiaircraft Trial-Shot Problem (Aberdeen, 1928).—The Coast Artillery Board is preparing a Bulletin for publication covering the methods developed at Aberdeen Proving Ground in 1928, with a view to standardization of the trial-shot problem for antiaircraft artillery.

Project No. 697, Service Test of Jekaduma Chronograph.—The Jekaduma Chronograph, tested at Aberdeen Proving Ground in 1928, has been issued to the Coast Artillery Board for service test at Fort Story and at Fort Monroe during the Spring and Summer. It will be tested in firings with all types of Coast Artillery materiel, i. e., antiaircraft, tractor drawn, railway, and seacoast. The Jekaduma will also be tested in connection with the test of Erosion Charts to be conducted under Project No. 694.

Project No. 698, Test of 155-mm. Sight Mount T-5.—A new 155-mm. Sight Mount T-5, with a panoramic sight and a 2-inch telescopic sight, has been issued to the 51st Coast Artillery (TD) for service test under the supervision of the Coast Artillery Board. This sight mount has been designed to replace the unsuitable panoramic sight for Case II fire. This sight mount will also be tested in Case II firing by the Department of Artillery, Coast Artillery School, in connection with instruction of the Battery Officers' Class.

Project No. 699, Graduation of Drum of M-1 (Vickers) Corrector to Take Account of Muzzle Velocity and Density.—This subject is under study. Its solution will permit the Vickers Corrector to be used as a ballistic computer.

BOOK REVIEWS

Napoleon and His Family: The Story of a Corsican Clan, Madrid-Moscou (1809-1813). By Walter Geer. New York: Brentano's. 1928. 6¼"x 9¼". 384 p. Il. \$5.00.

In his writings to date, Mr. Geer has specialized in France of the Revolutionary and post-Revolutionary periods. His published works include a study of Napoleon III and a happy excursion into the American Civil War, but otherwise he has restricted himself to the French Revolution and the Bonaparte era. He has already written particularly of Napoleon himself, of Josephine, and of Marie-Louise. Now he takes up the other members of the family.

The current volume is the second of a set of three, which are no more than necessary to sketch the careers of the numerous relatives and in-laws to whom Napoleon devoted much time and thought. The set is based upon periods of Napoleon's own history, and the first volume carried the clan through the tribulations of the Spanish episodes of 1808. The present book begins with the Austrian crisis of 1809 and continues the story of the Bonaparte family to include the close of the disastrous Russian campaign which brought to an end another period in the career of Napoleon.

One of the greatest handicaps under which Napoleon suffered was the fact that he was not born the eldest in his family. The Corsican tradition of deference to the oldest son, combined with Napoleon's own strong clan spirit, frequently created situations which reacted disadvantageously. Without the clan spirit he could have cut himself loose from his family and could probably have found for the kingdoms he set up rulers who would have been more loyal to him. His brothers, made kings by Napoleon, came to believe in the Divine Right of kings, ceased to be Frenchmen, and greatly embarrassed the Emperor in many ways. His sisters, too, made it necessary for Napoleon to make a deliberate effort not to know too much of what they were doing, for their histories, written in full detail would not make nice reading.

Joseph, in the four years from 1809 to 1813, shows no great capacity in Spain but manages to hold to his tottering throne through his advantage in being older than Napoleon. Louis, as king of Holland, becomes more Dutch than the Hollanders themselves, separates from Hortense, breaks with Napoleon, and is retired. Jerome continues to show a lack of capacity, is given a kingdom, and wrecks Napoleon's plans in the early phases of the Russian campaign. Lucien, probably the most capable of the Bonaparte brothers after Napoleon, continues to reject the Emperor's terms for reconciliations and leaves Italy, whence he is taken to England. Murat, married to Caroline, retains his throne at Naples, although he cannot be considered entirely loyal. The most faithful of the family was Eugene, Napoleon's stepson, who served as loyally after Josephine was divorced as before. This divorce was one of the two outstanding events in Napoleon's domestic circle of the time, the other being the birth of the king of Rome.

The whole period was one of suspicion, jealousy, and intrigue within the family, providing a tangled skein which the genius of Napoleon was unable to unravel. Mr. Geer, in his inimitable way, cleverly follows all the closely interwoven threads and shows how impossible it became for Napoleon to cut his way clear. He made mistakes and became only more deeply enmeshed. In the end, as the author will undoubtedly show us in his next book, the Emperor is carried to his downfall, principally because of his family.

How much different history might have been had Napoleon been an only son!

Gentleman Johnny Burgoyne. By F. J. Hudleston. Garden City: Garden City Publishing Co., Inc. 1927. 5½" x 8". 351 p. \$1.00.

This is another of the books that have proved their worth and have been chosen for publication in the Star Series at a popular price. In this series it appears in a class with *Trader Horn*, *Revolt in the Desert*, *Recollections and Letters of Robert E. Lee*, etc.

General Burgoyne was a happy-go-lucky soldier with some ability and more self-esteem, who was known, in his day, as "Handsome Jack" and who came to grief at Saratoga. Mr. Hudleston, with all the records of the British War Office at his disposal, finds "Gentleman Johnny" interesting and makes him so to us, although that would not require great effort, but even the author, unlike most biographers, does not attempt to make him appear great. He calls Sir Guy Carleton "by far the ablest British General in North America," although Dr. Randolph G. Adams and Hoffman Nickerson disagree with him, and all three of them overlook the claims of Cornwallis.

The book is interesting—exceedingly so, despite the author's determined effort to be funny, an effort that is sometimes labored and permits him to stray from his story. The study of the Saratoga campaign, marking as it does, the turning point of the Revolution, is important and General Burgoyne himself played a sufficiently prominent part in the war to be worth knowing. He was a gallant gentleman and followed gallantly that "profession which may be useful, but is often dangerous."

The Flight of the Southern Cross. By C. E. Kingsford-Smith and C. T. P. Ulm. New York: Robert M. McBride & Co. 1929. 295 p. Il. \$2.50.

There are four books that should rest side by side on the library shelves of those who pretend to keep abreast of the wonderful age in which we are living: *We*, which takes us to Paris with Lindbergh; *Record Flights*, in which we are carried to Germany with Chamberlain; *Skyward*, wherein we accompany Byrd; and now *The Flight of the Southern Cross*, which transports us across the Pacific to Australia. To each one of these narratives there is a similar objection. Being written by one of the principals of the voyage in each case, we suffer a loss in reading from the modesty which each one displays in writing. There is a certain indescribable something missing in the pages—which well becomes the writers to have omitted.

The authors of *The Flight of the Southern Cross*, possibly, give us more technical details of their preparations than is true in companion books. We learn of wing loading, power loading, and composite loading. We read in detail of the technique of blind flying and of the various instruments to assist therein. Problems of navigation and navigation instruments are covered. The personal training and preparation of the crew—in short, the account is complete from the end of the World War, when Kingsford-Smith first began to project his flight, until the Southern Cross landed at Sydney.

Certain features stand out preeminently:

- (1) The length of time spent in working up the flight.
- (2) The personal and mechanical preparation.
- (3) The financial difficulties encountered.
- (4) The deadly monotony of the night hours.
- (5) The terrific experience of riding the storm between Suva and Brisbane.
- (6) The continual worry about gasoline consumption.

We read every word in the newspapers, avidly, of this great flight. Now it is really worth while to study over the actual details of the flight and see how it was accomplished. *The Flight of the Southern Cross* is the very readable account of a great achievement, well prepared and ably carried out.—B. F. H.